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FOREIGN MILITARY REVIEW

No 11, November 1988

Maneuvers of the Enemies of European Security

18010358a Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 11, Nov 1988 (signed to press 10 Nov 88) pp 3- 6

[Article by Maj Gen V. Kozhin]

[Text] New political thinking in international relations has become a demand of the time. The threat of world catastrophe which mankind encountered assumed such a dramatic nature that, as M. S. Gorbachev emphasized, "old ideas and recipes are no longer of use" for eliminating it. Uncommon approaches are required to problems whose solution determines the fate of human civilization. Not only did the Soviet Union show that military confrontation can only reinforce mistrust among peoples, but, having advanced the concept of new political thinking, the Soviet Union is also actively implementing such thinking in the direction of ensuring universal peace and security.

It was the realization of Soviet initiatives that led to the appearance of specific favorable trends in international life. The program of a nuclear- free world proclaimed by the Soviet Union in January 1986 permitted moving the matter of disarmament off dead-center. A major breakthrough was made in the direction of real disarmament: the INF Treaty was concluded. Progress was reached at the Soviet-American talks over a 50-percent reduction in strategic offensive arms. Talks on a reduction of armed forces and conventional arms in Europe from the Atlantic to the Urals are on the agenda.

At the same time, there has not yet been a radical change for the better. The world military-political situation retains its complicated and contradictory character. No guarantees of the irreversibility of positive processes have as yet taken shape. Realism in the policy of the United States and other NATO states neighbors on confrontational trends reflecting the interests of the most militant groupings of the West's ruling circles. Imperialist sources of aggression and wars continue to exist.

The governments of North Atlantic Alliance countries are not giving up the "nuclear deterrence" policy. While coming out in words for a reduction in nuclear and conventional arms, they are in fact continuing to build up military preparations and they are drawing up plans for "up-arming," "compensation," and other militarist programs. Plans for strengthening NATO's "European base" are being discussed actively in Western Europe on the basis of antisovietism; these plans provide for activating the process of military integration of the bloc's European participants with the objective of strengthening their military potentials. Reliance continues to be placed hereon force and on ensuring security in a unilateral manner. Proponents of those plans clearly dislike further development of the Pan-European process on principles of trust, peaceful coexistence and disarmament. They advance the idea of a "European defense" in response to the proposal by socialist countries to establish a "Pan-European house." On the one hand, by admission of the London newspaper TIMES, they are troubled by the Soviet-American rapprochement and on the other hand they are attempting to have greater weight in developing bloc plans.

The report of the North Atlantic Assembly (the organization which unites parliamentarians of NATO countries) recommends a broad spectrum of measures for strengthening NATO's "European base." They include creating a "European division" activated from servicemen of different countries; instituting a common fund for developing new weapon systems; and having states which are not part of the bloc's military structure place bases at NATO's disposal "in crisis situations." The report's authors insist that "nuclear weapons will continue to play a key role in the deterrence doctrine." Therefore they propose "to examine seriously the question of stationing a limited number of long-range cruise missiles on bombers in Europe," which must "compensate" for the intermediate and lesser-range nuclear weapons subject to destruction under the INF Treaty.

France and the FRG are especially active in supporting a "European defense" system. A similar project for a "European defense community" was advanced back in the early 1950's, but the French Parliament's refusal to ratify the treaty putting the community together prevented a "European army" from being brought into the world. Now, however, it is France that is heading those forces which perceive a "nuclear Munich" in the INF Treaty and demand a strengthening of the NATO bloc's "European base."

Basic principles of a "Eurodefense" were approved at the initiative of the French leadership during a session of the Western European Union [WEU] Council held in the Hague in October 1987. These principles indicate that the system being planned is to be based on conventional and nuclear arms and is to include a U.S. military presence in Europe. In the concept of its proponents, the cornerstone of the "Eurodefense" is to be Franco-West German and Anglo- French military cooperation. The document adopted by the WEU Council emphasizes in particular that the system of "European defense" must be established in close coordination with the North Atlantic Alliance and promote its strengthening.

An agreement on forming the first integrated large troop unit, signed by President F. Mitterrand and Chancellor H. Kohl in January 1988, became one of the specific manifestations of Franco-West German military cooperation. A mixed Franco-West German brigade, which Mitterrand calls the prototype of a "European army," shows the direction in which the first steps are being

taken in organizational development of European integrated armed forces. The brigade's activation began in October 1988. Total personnel strength is up to 4,200 persons and it is stationed in Böblingen (near the city of Stuttgart, FRG).

A mechanized regiment, armored cavalry regiment and reconnaissance squadron will be included in the brigade from the French side, and there will be a motorized infantry battalion, artillery battalion, tank company, engineercompany, as well as a supply battalion (being formed jointly) from the West German side. The brigade commander's position will be held alternately by representatives of the French and West German armed forces. According to former French Minister of Defense A. Giraud, the brigade will operate under the cover of French nuclear weapons and "possess the capability of interworking with NATO troops."

In wartime it is planned to transfer the mixed brigade to the operational subordination of the Supreme Allied Commander Europe. Preconditions thus are being established for returning France to the NATO military organization. According to a statement by West German Gen W. Altenburg, a representative of the bloc's Military Committee, activation of the Franco-West German brigade "will permit involving France in the NATO military organization in one way or another."

The conduct of the very large operational-tactical Exercise Kecker Spatz involving armed forces of France and the FRG simultaneously with a series of NATO Autumn Forge maneuvers indicates France's rapprochement with NATO. During that exercise the French contingent from the Force d'Action Rapide operated in the immediate vicinity of borders of countries of the socialist community. The foreign press noted that it was not precluded that French troops were practicing actions as part of the first echelon of NATO's Allied Armed Forces in the Central European sector.

The leadership circles of the two countries already are fostering plans to activate a mixed Franco-West German division and subsequently also a corps. It is planned to station these forces as close as possible to the border with the GDR and CSSR.

Cooperation between France and the FRG is not limited to the sphere of general purpose forces. It is also beginning to extend to nuclear arms, which naturally is causing concern among European peoples. Official Paris circles, however, prefer to ignore the dangerous consequences of Bonn's access to nuclear weapons. Moreover, there are open calls in France for the nuclear partnership of France and the FRG to be given a "green light." The French press frankly wrote that "there can be no Europe without a Franco-West German bomb."

Certain French political figures go even further. For example, former French Minister of Defense C. Hernu declared that "in the French government's place I would give Bonn and Paris the keys (to nuclear weapons—V.K.) at the present time without hesitation." These recommendations indicate that there are influential forces in France who do not intend to stop at Franco-West German consultations on questions of employment of French nuclear weapons and are ready to give the West German militarists access to the nuclear button.

Proponents of a "European army" intend to involve Italy and Spain as well as other NATO countries in its organizational development. A trilateral agreement already has been concluded on establishing a mixed battalion with the participation of Belgian, Dutch and Luxembourg subunits. A joint naval squadron of WEU countries under the command of a UK representative operated in the Persian Gulf area.

Great importance is attached to expanding the military-technical cooperationof West European states within the scope of the process of their military integration. In the next few years it is planned to create prospective third generation European antitank guided missile systems; a common fighter, transport, and helicopter; aircraft guided weapons; and a standard NATO frigate of the 1990's. It is believed that the economic foundation of the "European defense" system will be strengthened through joint efforts of West European countries in the sphere of military industry.

Chief alliance is placed on the Anglo-French axis with respect to the nuclear aspect of a "Eurodefense." Meetings of ministers of defense, which have assumed a regular character, discuss questions of unifying efforts of the two countries in this area, including creation of joint models of nuclear weapons, particularly an air-launched cruise missile. The British press noted that through these projects Paris and London "intend to plug the hole formed in the NATO defense after conclusion of the INF Treaty."

At the same time both countries are modernizing their own nuclear forces under the pretext of a "weakening of the strength of the American nuclear umbrella." It is common knowledge that France plans to radically replace its missile submarine fleet by the mid-1990's and that over the next six years Great Britain plans to launch new Trident system SSBN's. The foreign press unequivocally gives one to understand that the cooperation of France and Great Britain in the area of joint planning and combat employment of strategic nuclear forces cannot be excluded. It was pointed out, for example, that during a meeting of ministers of defense in October 1987 there was a discussion of questions of ensuring security of SSBN bases as well as possible directions for development of both countries' nuclear strategy. In "patching the holes" allegedly being formed in NATO's defense, the British and French leadership is taking steps which in fact only complicate the path to a nuclear-free Europe.

At the present time the majority of "Eurodefense" proponents are linking its establishment with an activation of the WEU. In the early 1980's such attempts stumbled on sharp U.S. resistance to a unification of allies outside the framework of NATO. The Reagan administration directly warned its West European partners that the only organization where the West's position on military-political issues can be developed is the North Atlantic Alliance.

But after the WEU Council session in the Hague especially confirmed the need for a constant U.S. military presence in Western Europe, the Reagan administration came out in support of plans for a "Eurodefense." The United States is counting on the fact that development of military integration in Western Europe will lead to a considerable strengthening of NATO, an increase in the partners' financial contribution to bloc military expenditures, and a strengthening of the West's military positions as a whole. The president's report "National Security Strategy," sent to Congress in January 1988, emphasized: "Our allies show a growing readiness to play a more significant role in providing for the defense of Western Europe. We welcome this trend, realizing that we rely on the strength of an invariable alliance of partners and that the growing contribution of allies is important for ensuring the Alliance's vitality over the long term."

One of the substantial shortcomings of the WEU as an organizational base for the "European defense" system is considered to be the limited make-up of itsparticipants. In this connection the April 1988 session of the WEU Council came out in favor of expanding its make-up. In accordance with this decision, talks began in late May 1988 about the entry of Spain and Portugal into the WEU; it is expected that the talks will last until the end of 1988. Subsequently it is planned to connect Turkey, Greece, Denmark and Norway to it.

In substantiating the need for creating a "Eurodefense" system, western ideologs write about it as about a kind of "third force," which allegedly will be "between the United States and USSR." As a matter of fact, it is a question not of defensive efforts, but of a system providing for the strengthening of NATO and aimed against the Soviet Union and other socialist countries. Facts indicate that while declaring in words its adherence to the cause of peace and disarmament, the military-political leadership of leading West European states has set a course toward military integration and a buildup of militarist efforts. The schemes of "Eurodefense" proponents do not meet the spirit of the time, they contradict the new political thinking, and they undermine trust and peaceful coexistence in Europe.

The Arctic in U.S. Military Plans (Past, Present and Future)

18010358b Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 11, Nov 1988 (signed to press 10 Nov 88) pp 6- 10

[Article by Capt 1st Rank A. Romanov]

[Text] By admission of American historians, the United States showed an interest in studying and developing the Arctic basin considerably later than some European countries. The beginning of its conquest of the Far North was in the summer of 1850, when an expedition commanded by U.S. Navy Lt De Hovin departed aboard two vessels to search for missing British polar researcher Franklin. Many decades before this the Englishman Hudson and the Russian trailblazer V. Ya. Chichagov visited the high latitudes for the first time.

The almost 140-year history of carving out an "American route to the Pole" is conditionally divided into two periods. The first (from 1850 to the mid-1920's) is called the reconnaissance period. It included repeated attempts by American researchers to reach the North Pole on vessels, with dogs, on skis, and in air balloons. As a rule all expeditions were financed with the active participation of the government and the Navy command. The results were discoveries within the Canadian Arctic Archipelago, accumulated experience of survival under polar conditions, and the first skills in navigating in high latitudes using portable instruments. It was only in April 1909 that American R. Peary managed to make his way to the "top of the world." Despite some doubts, he is given priority in world literature as the discoverer of the North Pole.

The second period of American expansion in the Arctic continues from the mid- 1920's to the present; after World War II it acquired a clear-cut militarist direction. A notable event of this period was the participation of American L. Ellsworth in the expedition of Norwegian polar explorer R. Amundsen, who crossed the Arctic Ocean in the dirigible "Norway" from the island of Spitzbergen across the North Pole to Alaska in 1926. In that same year two Americans—naval officer R. Byrd and pilot F. Bennett—made a nonstop flight over the Pole in an aircraft. In 1931 the first attempt was made to cross to the North Pole beneath the ice in the submarine "Nautilus," specially modified for this purpose, but a break in the rudders and other malfunctions forced the head of the expedition and the crew, which basically included American volunteer sailors, to abort the voyage back near Spitzbergen.

The postwar development of aviation, the Navy, communications and radar transformed the American Arctic program from a geographical to an appliedmilitary program. Flights by U.S. military aviation over the water area of the Arctic Ocean in a western and eastern direction assumed a regular nature. The U.S. Air Force Strategic Air Command [SAC] was created in 1946. It

immediately began conducting major exercises in Arctic areas. B-29, B-36 and B-50 strategic bombers (using KB-29 tanker aircraft) were the primary means for delivering nuclear weapons at that time; they actively mastered routes leading to the USSR's borders by the shortest path across the North Pole. In 1947 the SAC command began aerial mapping of Alaska, Iceland and the island of Greenland.

After the Korean War (1950-1953) the U.S. military-political leadership set a course toward an unprecedented buildup of the strategic aviation aircraft inventory, an improvement in aviation equipment and armament, and development of forward bases in the Pacific zone, Europe and North Africa. But the most important measures involving SAC operational and combat training, however, continued to be oriented toward the northern strategic sector. For example, in December 1956 up to 1,000 bombers and tanker aircraft practiced missions of a global nuclear offensive over northern areas of the United States and Canada as well as over Greenland within the scope of exercises Powerhouse and Roadblock.

Creation of the B-52, FB-111A and B-1B aircraft, the Snark ground-launched intercontinental cruise missile, air-to-ground Hound Dog and SRAM guided missiles, as well as modern AGM-86B air-launched cruise missiles always has been accompanied by their tests under Arctic conditions.

The first experimental cruises of U.S. Navy nuclear-powered submarines [SSN's] SSN 571 "Nautilus," SSN 578 "Skate," SSN 583 "Sargo" and SSN 584 "Seadragon" took place in the period from 1957 through 1960. They proceeded from the Atlantic and Pacific to the North Pole, thereby proving the possibility of employing submarine forces in the Arctic zone. The foreign press reports that since then the under-ice operation of American submarines (and according to some data British submarines as well) became part of combat training practice. In addition to performing oceanographic, hydrologic and navigational research and testing new equipment on such a cruise, operational training missions and tactical procedures are practiced in lone and group employment of submarines.

In 1987 the U.S. Naval Institute journal PROCEEDINGS published a selection of articles under the general title "Special Arctic Focus," accompanied by a photograph of American submarines SSN 676 "Billfish" and SSN 664 "Sea Devil" and the British "Superb," which had surfaced at the same time in a polynya. This tendentious photo attested to the fact that preparation for combat operations in northern areas is being conducted not only by the U.S. Navy, but by its NATO partners as well.

As always in such situations, western strategists attempt to justify the intensified military preparations in the Arctic basin by the allegedly growing military threat on the part of the Soviet Union in this region. To intimidate the uninitiated and justify their aggressive schemes, they not only set in motion "intimidating" information about the make-up of Red Banner Northern Fleet ships and aircraft, but also information about construction of nuclear- powered icebreakers and commercial vessels in the USSR. Avoiding acknowledgement of the importance of the Northern Sea Route for the Soviet Union's economy and of the northern seas for ensuring its defensive capabilityand ignoring existing limits of reasonable sufficiency, western specialists assert that our naval infrastructure in the North is intended for conducting military operations in the Arctic. Soviet nuclear-powered missile submarines, allegedly readying to deliver a missile strike against U.S. territory from beneath the ice, also occupy more than the last place in heaping up such fantasies. To be convinced of the true state of affairs, however, it is enough to refer to the facts and to statements by high-placed American figures

The American command's stepped-up interest in the Arctic reflects its desire for geographic escalation of militarist preparations and creation of one more theater of operations. Former U.S. Secretary of the Navy J. Lehman emphasized that the Arctic is "a major potential zone for carrying out U.S. naval operations." In his opinion, the only way to contain the Russians north of the Greenland, Iceland, Great Britain line is to be here, forcing them to defend from the very outset.

Despite the operational scope of activity by strategic aviation and submarine forces in the Arctic zone, some American military specialists declare there have not been enough efforts to develop the Arctic Ocean for military purposes. From their point of view, militarization of the Far North must extend beyond the limits of areas encompassed by the yearly Global Shield exercises of the U.S. strategic forces, under-ice voyages of nuclear-powered submarines, the wide-scale Naval Research Arctic Program, and plans for building new Type SSN 21 SSN's with an "under-ice profile." The demands of apologists for preparation of war include having the top American leadership recognize the Arctic basin as a future theater of operations and give it long- term priority. The idea is put forth to form a so-called Arctic Naval Command with the objective of developing war contingency plans for operations in the zone situated north of the Arctic Circle. It is proposed to take the organization of the U.S. joint command in Central and South America as a model.

It is believed that the new command should not have its own permanent personnel and equipment in peacetime. Therefore it is planned to transfer units and subunits of mixed forces to it in temporary operational subordination only for an exercise period. It is to accomplish the following primary missions under the immediate direction of USCINCLANT or USCINCPAC and in close coordination with the Navy Staff Operations Directorate: plan the integrated tactical employment of nuclear-powered multirole submarines, naval aviation, units and

subunits from the Marines and the Joint Special Operations Command, Air Force, and Army aviation; coordinate the activities of interested ministries, departments, and state and private organizations in military- political and military-technical matters concerning the polar region as well as problems of collecting and analyzing appropriate intelligence, preparing a logistic infrastructure and so on.

It is planned to organize six directorates as part of this command's staff (administrative, intelligence, operations, planning, logistics and communications), staffed by personnel who have experience of serving or working in polar areas. There is to be a deputy and chief of staff subordinate to the CinC representing submarine forces and aviation, while other management positions will be occupied by senior officers of branches and arms brought in to take part in operations. It is planned to locate thecommand's headquarters at the headquarters of USCINCLANT.

American military specialists picture the fundamentals of preparing and conducting operations (combat operations) by mixed forces in the Arctic as follows. Inasmuch as they allegedly "constantly note a displacement" of Soviet SSBN's from the Atlantic and Pacific oceans beneath the pack ice of the Arctic Ocean, operations beyond the Arctic Circle will basically have an antisubmarine character. The possibility of performing missile launches from beneath the ice is argued by the circumstance that even in the coldest months (January-April) up to three percent of the ocean surface remains free of a solid sheet of ice and it is always possible to find polynyas and sectors with thin ice which a submarine always can use for surfacing and launching missiles. After that she takes cover beneath the continuous ice field, remaining invulnerable to aircraft and undetectable by enemy submarines, especially when maneuvering to the underside of the ice field.

It is planned to employ mobile and fixed assets to conduct antisubmarine operations. The principal ones are considered to be "Sturgeon"-, "Los Angeles"- and "Seawolf"-Class nuclear-powered multirole submarines capable of detecting and engaging the underwater enemy in the open ocean and beneath the ice on their own or from data of a sonobuoy system (base) put out in advance by aircraft. The strong aspects of SSN's in antisubmarine operations include conformity of their design and armament to the combat role, lengthy endurance, independence of sea and weather conditions, concealment of maneuver, low vulnerability to air strikes, and the capability of tracking an enemy submarine from the moment she departs base until she enters the patrol area and attacking her immediately after receiving instructions.

For operations under ice conditions the sail and sail planes (shifted to a vertical position when surfacing in the ice to avoid being broken) were strengthened and sonar transceiver arrays and masts were given protection on American "Sturgeon"-Class SSN's back in the period when the series was built (37 submarines, 1963-1975). It was planned to perform similar measures on 33 "Los Angeles"-Class SSN's, the last in a series of 67. Retractable biplanes are installed instead of sail planes, hull components are strengthened, and additional sonar gear is accommodated beginning with the 34th submarine (Type SSN 721 "Chicago"), transferred to the Navy in 1987, and on all subsequent ones. In additional to this work, it is planned to protect the screw on "Seawolf"-Class SSN's with a special shroud. According to American press reports, short-range, high-resolution sonar, ice fathometer-profilographs for automatically measuring and recording thickness and other characteristics of the ice cover, as well as other under-ice navigation instruments have been developed or are being improved.

Navy command representatives assert that American nuclear-powered submarines can set off from their bases along ocean routes for Arctic patrol areas, and can use the Bering, Barrow, McClure, Kennedy and Robson straits to avoid enemy countermeasures. Former U.S. Navy Chief of Naval Operations Adm J. Watkins at the same time emphasizes that the SSN's can pass through those shallow straits only with a favorable ice situation, when depths permit safe navigation. Authors of published material on this subject see a solution in organizing a permanent combat patrol of nuclear-powered submarines in the Arctic Ocean and building up forces there in a threat period.

It is reported that the SSN's will resort to the following tactical devices in antisubmarine warfare: ambush (near Soviet submarine bases, at the edge of pack ice, in presumed combat patrol areas, near large polynyas) or hunt (independently, from vectoring on routes or deployment lines, as well as in the area beneath the ice). The use of quiet movement regimes (not over 5 knots) and a minimum number of sonar activations in an active mode (to ensure concealment and to avoid receiving numerous false echoes from ice stalactites and ice field irregularities) is considered an axiom.

American specialists include above-ice and under-ice sonobuoys of various designs among fixed means of detecting submarines beneath the Arctic pack ice. According to estimates by Pentagon experts, with buoys being placed by aircraft or helicopter at a 25 nm interval and with distances of 100 nm between parallel lines it will require up to 600 sonobuoys in summertime and up to 1,200 in the winter period to establish a base of detectors with the objective of covering the entire pack ice surface. Data on the underwater situation coming from the sonobuoys are to be transmitted via satellite or relay aircraft to command posts controlling the operations of antisubmarine forces. As reported by the journal PROCEEDINGS, on order from the Navy command the U.S. Defense Department Advanced Research Projects Agency already has placed a small experimental satellite in orbit for this purpose.

Representatives both of the Navy as well as other branches of the Armed Forces favor militarizing the Arctic basin. They declare that submarines alone will not accomplish the mission. Airmobile forces having a high rate of deployment into polar areas, swiftness of reaction to changes in the situation, and stable operational command and control channels and other advantages can be a substantial and necessary supplement to submarines. It is admitted that V-22 Osprey VTOL aircraft having a maximum flight range up to 1,300 km, a speed up to 740 km/hr and a load-carrying capacity up to 5.5 tons, as well as CH-47 Chinook and UH-60A Black Hawk helicopters, which have been used in Alaska, can best meet the theater's features. The required detail of aviation is estimated at approximately 700 aircraft and helicopters. In Arctic operations they will accomplish the following missions: delivery and placement of a sonobuoy system; movement of stores of arms, supplies and personnel; and participation in hunting and killing enemy submarines. To ensure high combat readiness of mobile forces at a considerable distance from continental bases, it is planned to solve the problem of basing aviation by setting up temporary ice airfields and helicopter pads and constructing living compounds, depots for weapons, POL, provisions and spare parts, and other facilities in their areas. It is planned to replenish stores there from continental bases by having cargoes delivered by C-130 aircraft of military transport aviation (by the ice landing or drop method).

It is presumed that in contrast to submarines, the airmobile forces will operate in the Arctic while under constant threat of enemy air strikes. Therefore the organization of air defense is viewed as a very important component of Arctic operations. Air defense resources can include surface-to- air missile systems (for covering large ice airfields and depots), fighters, and early warning aircraft. In addition, it is planned to make wide use of camouflage and the dispersal of installations.

Authors of the idea of turning the Arctic Ocean into a theater of undersea warfare direct attention to features of employing weapons and equipment inthis region. First of all, sea- and air-launched torpedoes must have special protection against damage to the warhead, propellers and case from ice impacts. With the brief duration of contacts with enemy submarines, it is necessary to provide for an increase in the unit of fire of weapons and in the range of torpedoes for reliable engagement of enemy submarines at long ranges.

Secondly, Arctic basin areas with depths around 4,000 m essentially preclude the use of seabed and moored mines. Therefore the question is being posed about developing special mines "suspended" from the ice. Thirdly, to employ mine ordnance in areas of continuous pack ice it may be necessary to have subunits of the Marines or Army aviation which will periodically drill through or blast the ice. Fourthly, such nonacoustic means of hunting submarines as magnetic anomaly detectors as well as infrared and laser gear may prove especially effective in an ice situation.

U.S. military specialists conclude the advisability of comprehensive use in Arctic operations of various personnel and equipment ensuring an overlapping of search areas and engagement of the enemy with several kinds of weapons.

Many foreign publications reduce Arctic problems basically only to missions of combating Soviet submarines located beneath the ice of the Arctic Ocean, but printed materials also are encountered which consider American submarines with Tomahawk cruise missiles patrolling in Arctic waters in the attack option. U.S. Navy specialists emphasize that an increase in strength of such submarines will force the Russians to concentrate on defending their bases and SSBN's. The possibility of American submarines delivering strikes with cruise missiles against naval bases and ports, air defense system facilities, airfields, command posts, communications centers and depots independently or in coordination with surface combatants and combat aircraft is pointed out especially. These considerations are not projected to any specific theater or individual sector, but are of a general nature. Nevertheless, such views refute attempts by Pentagon strategists to depict preparation for war in the Arctic as being planning only for antisubmarine operations allegedly to be undertaken for defensive purposes.

The U.S. Navy command does not conceal its intentions to attempt to organize the search and destruction of Soviet submarines at sea and in bases in the course of a conventional war with the objective of reducing the potential of the enemy's nuclear forces. That statement of the question is illogical, however, especially after publication of the defensive military doctrine of Warsaw Pact member states. The Soviet Union is not attacking anyone first and will not be first to employ nuclear weapons. It follows from this that in the Arctic the United States is planning to neutralize second-strike forces, but there will be no second strike if an aggressor does not make a nuclear attack.

The United States is not planning to build a new "defensive belt" beyond the Arctic Circle at a distance of several thousand kilometers from its territory, but to include the Earth's fourth ocean in the sphere of its "vital interests," extend maritime strategy to it and create a new springboard for aggression.

American-Belgian Exercise Usling-88

18010358c Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 11, Nov 1988 (signed to press 10 Nov 88) p 16

[Article by Lt Col M. Rzhevskiy]

[Text] In the period from 25 April through 11 May 1988 an American- Belgian exercise codenamed Usling-88 was conducted on the territory of Belgium (in Liège Province). Its objective was a practical test of readiness of the

Belgian territorial defense forces, militarized formations, and populace to combat enemy reconnaissance and raiding parties inserted on the country's territory in wartime. The foreign press reports that Exercise Usling-88 was part of a series of similar maneuvers conducted in European NATO countries, particularly Norway.

U.S. Special Forces subunits and some of the personnel of a separate Belgian Army commando parachute regiment were used for the exercise on the side of the Orange (the "enemy"), with command and control entities and formations of internal forces, the gendarmerie and the police on the Blue side. The 3d and 6th separate infantry battalions reinforced by reservists were directly assigned for hunting and destroying the "raiders." A total of over 1,100 persons from the Belgian Armed Forces took part.

Exercise Usling-88 was conducted in two phases.

In the first phase (25 April-2 May) the Orange forces practiced problems of concealed forward movement to assigned areas and the Blue practiced hunting and detecting "enemy" reconnaissance and raiding parties. The "raiders" were dropped by parachute from aircraft. In accordance with the plan, their missions included "destroying" 16 of the strategically most important installations—command and control facilities, communication centers, dams, bridges, pipelines, depots and others—where knocking them out would hamper combat employment of the armed forces of Belgium and its NATO partners. Reinforced security of installations, patrolling, and ambushes on possible movement routes of the reconnaissance and raiding parties were organized in this period and coordination was arranged among military command and control entities, the gendarmerie and the police. Informers from the local populace were actively used to hunt "hostile elements," and appropriate appeals by local authorities were addressed to them for giving assistance in collecting necessary information. The most effective help came from foresters, insurance agents and other persons having an opportunity to travel over vast areas and question local residents. In addition, reconnaissance aviation was used forhunting the reconnaissance and raiding parties; it took part in an exercise for artillery subunits of NATO mobile forces called "Ardent Ground-88," conducted on nearby Elsenborn Range.

In the second phase (3-11 May) missions were accomplished under near-real conditions to eliminate the detected reconnaissance and raiding parties and detain the "raiders." A system of command posts which included a fixed command post in the city of Liège and mobile command posts (on trucks) at lower echelons (including company and platoon levels) was deployed for providing direction and for coordinating the measures. Each of these posts had radios, kept situation maps, collected necessary information and made it known to appropriate performers. Captured "raiders" also were brought here for interrogation. Troop subunits were moved to assigned areas on vehicles and helicopters in pursuing and eliminating the parties.

A characteristic feature of the exercise's second phase was wide use of free game elements, i.e., an absence of rigid, detailed regulation of participants' actions. In the assessment of foreign specialists, this helped to form an atmosphere of competitiveness and tough opposition and to display initiative and enterprise.

Exercise Usling-88 was used to exchange experience among American and Belgian troop personnel. U.S. specialists in particular informed their NATO ally about methods they use for reconnaissance and raiding activities and for ensuring survivability of reconnaissance and raiding parties in the enemy rear. This exercise helped kindle an atmosphere of spy mania and antisovietism among Belgian Armed Forces personnel and the population.

The Danish Army

18010358d Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 11, Nov 1988 (signed to press 10 Nov 88) pp 17- 22

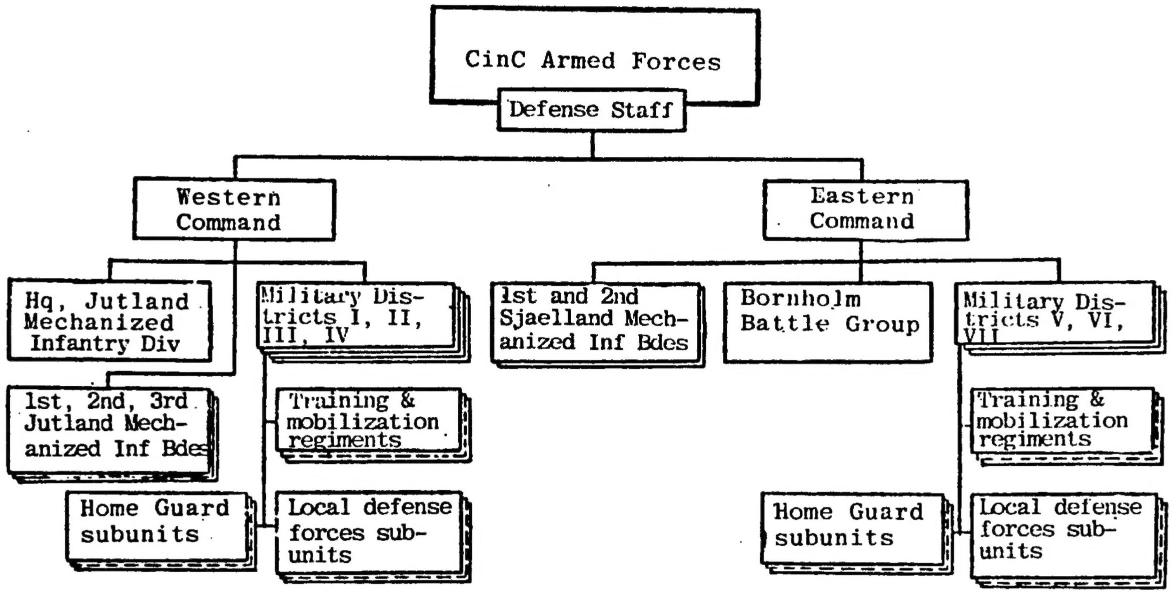
[Article by Lt Col A. Kovrov]

[Text] The Danish military-political leadership is devoting great attention to developing the Army in accordance with the "flexible response" strategy and "forward positions" concept adopted by NATO. The Army is called upon to provide conditions for the movement and receipt of reinforcing troops from the United States and Great Britain in a crisis situation as well as to conduct combat operations together with allies at the boundary of the Northern European and Central European sectors.

The foreign press notes that the Army is the largest branch of the Armed Forces and in peacetime numbers over 17,000 persons, of whom there are over 8,500 in combat-ready units, around 4,000 in training-mobilization regiments, 4,300 in military educational institutions and command and control entities, and over 300 in UN forces. In addition, there are almost 3,500 civilian employees in headquarters and large and small units of the Army. According to foreign press data, during mobilization Army strength can be brought up to 72,000 persons using reserve components (around 51,000) and local defense troops (21,000). The Army organization is given in Fig. 1.

The Army Inspector, who is responsible for manning large and small units, organizing combat training, and developing regulations and manuals, exercises administrative direction over the Army. He is the adviser to the armed forces commander in chief in matters of Army organizational development and employment. In his

Fig. 1. Danish Army organization



work the Inspector relies on the Army staff, which functions as a directorate and is part of the Defense Staff. The staff has the task of drawing up plans for development of the Army; drawing up combat training programs; monitoring training progress; working out methods of combat employment of large and small units; manning; as well as developing regulations, manuals and instructions. The staff consists of four inspectorates headed by corresponding inspectors: combat training, fire support, engineer troops, and signal troops. In addition, it includes four departments: personnel, logistics, staff judge advocate and chaplains. Inspectors are responsible for manning of units and subunits of their owncombat arms and organizing their combat training, and they decide other matters. Military educational institutions, schools and combat training centers of the Army are immediately subordinate to the Army Inspector.

The commander in chief of the country's Armed Forces exercises operational direction of the ground forces. In case a military threat arises or with the onset of military operations, the most combat-effective portion of the ground forces can be transferred to the commander in chief of Denmark's operational forces, who at the same time is the commander of NATO Allied Forces Baltic Straits. The Armed Forces CIC directs ground forces through the Defense Staff and staffs of the Western and Eastern Commands. The staff of the Eastern Command simultaneously is the staff of NATO allied ground forces in the Danish Islands. Territorially the Western Command includes the Jutland Peninsula and the islands of Fyn and Langeland, while the Eastern Command includes the islands of Sjaelland, Möen, Falster, Lolland and Bornholm. The boundary between them runs along the Great Belt and Langeland Belt. Their commanders in chief are responsible for organizing combat training, logistic support, and mobilization and operational deployment, as well as for directing combat operations of subordinate forces in their zone of responsibility.

Administratively the territory of Denmark is divided into seven military districts: four in the Western Command and three in the Eastern. In peacetime the military district on Bornholm Island is directly subordinate to the Armed Forces CIC. The military district commander (usually the commander of one of the training-mobilization infantry regiments) is responsible for organizing combat training of regular troops and the reserve, for mobilizing reserve units and subunits, and for territorial defense. He basically has local defense and Home Guard subunits operationally subordinate to him, and in some cases regular troop units may be placed at his disposal.

The foreign press reports that the Army has the following combat arms: infantry, armored troops, artillery, signal troops, engineer troops, logistic troops; and it has the following services: artillery equipment, quartermaster, medical, and veterinary. In its operational role the Army is divided into field troops and local defense troops. It is reported that the Army also has Home Guard units and subunits.

Field troops include the most combat-effective large and small units; they are manned by personnel who are up to 35 years of age and they are outfitted with modern materiel. In peacetime their make-up also includes so- called "screening troops" and training-mobilization regiments.

The *"screening troops"* include combat-ready large and small units and subunits intended for supporting mobilization and operational deployment of the Army main body. According to western press data, they include the

headquarters of the Jutland Mechanized Infantry Brigade, five mechanized infantry brigades (1st, 2d and 3d Jutland and 1st and 2d Sjaelland), the Bornholm Battle Group (an infantry brigade), as well as other subunits. They have over 200 tanks, around 400 field artillery pieces and mortars, approximately 400 antitank weapons, over 500 APC's, and more than 20 Army aviation aircraft and helicopters in their inventory. There is a reserve of "screening forces" numbering around 16,500 persons for bringing these large and small units up to wartime strength levels.

Training-mobilization regiments (eight infantry, two armor, three artillery, two engineer, two signal and two transportation) represent training centers for the training and retraining of servicemen of various specialties for regular and reserve large and small units as well as subunits of local defense forces. The Western Command includes five infantry and two artillery regiments, the Eastern includes three infantry regiments and one artillery regiment, and the other regiments are divided evenly between the commands. The staffs and subunits of mechanized infantry brigades are stationed territorially in military compounds of corresponding training-mobilization regiments (by combat arms) and use their training facility for combat training with the objective of economizing on material and financial resources. For example, a regiment has several subunits of regular forces and training subunits in whose facilities reservist refresher training courses are organized.

Being a base for the deployment of wartime large and small units, each regiment activates and trains the reserve units and subunits assigned to them and transfers them to appropriate brigade commanders during mobilization. For example, the Jutland Battle Group (a reduced-strength infantry brigade) is deployed on the base of the Jutland Armored Regiment (headquarters at Holstebro), the Guards Infantry Regiment (Copenhagen area) forms the 1st Sjaelland Battle Group, the Sjaelland Armored Regiment (Naestved) forms the 2d Sjaelland Battle Group, the Danish Infantry Regiment (Vordingborg) forms the 3d Sjaelland Battle Group, the Sjaelland Infantry Regiment (Slagelse) forms the 4th Sjaelland Battle Group, and so on.

In the views of the Army command, the division is the highest tactical large unit. In case of war, one mechanized infantry division (Jutland) consisting of three Jutland mechanized infantry brigades and other combat and logistic support units will conduct combat operations in the order of battle of this branch of the Armed Forces. The possibility of deploying one other division on the basis of the Sjaelland mechanized infantry brigades also is not precluded. According to western press reports, each of the divisions in addition can include an armored battalion, antitank battalion and reconnaissance battalion, two or three artillery and one or two antiaircraft artillery battalions, an Army aviation squadron and support subunits. The personnel strength can reach 19,000. The division inventory consists of up to 150 tanks (Figs. 2 and 3 [figures not reproduced]), around 230 guns and mortars, up to 280 antitank weapons, and other weapons and military equipment.

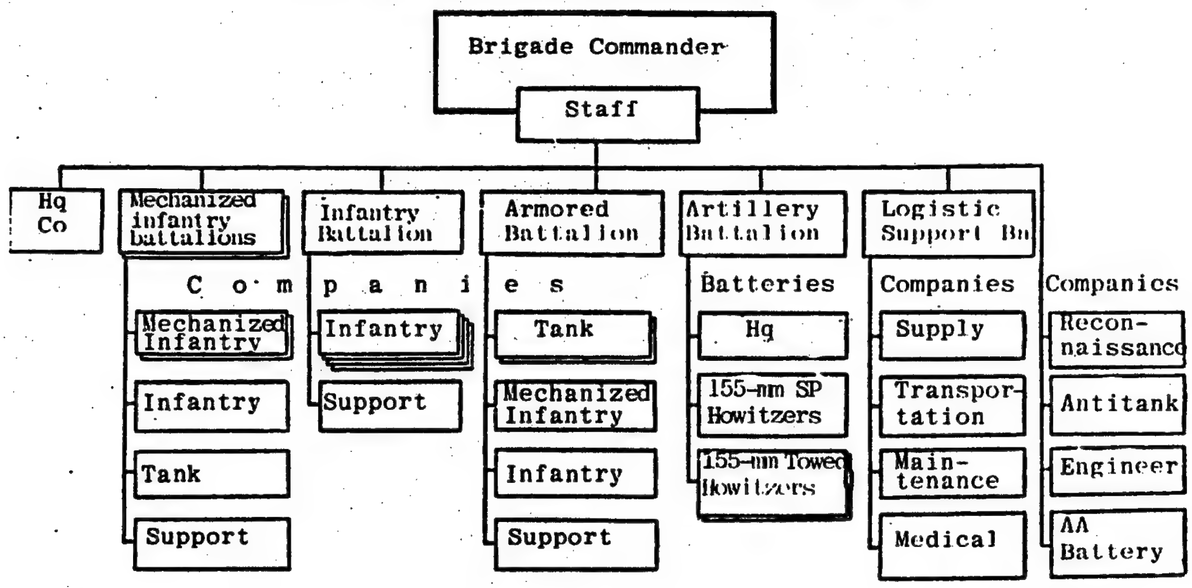
The mechanized infantry brigade is the Army's basic tactical large unit. The foreign press reports that its make-up (Fig. 4) consists of a headquarters and headquarters company, two mechanized infantry battalions, one infantry battalion, one armored battalion, one artillery battalion, reconnaissance company, antitank company, engineer company, antiaircraft battery, and logistic support battalion. The brigade's personnel strength is around 5,000. Its inventory includes 47 tanks, around 150 APC's (Fig. 5 [figure not reproduced]), 18 field artillery pieces, 40 mortars, 14 ATGM launchers, 64 recoilless guns, 9 antiaircraft guns, modern small arms and other military equipment. The Jutland mechanized infantry brigades have more modern weapons and combat equipment in contrast to the Sjaelland brigades. In particular, the former have West German Leopard tanks and the latter have British Centurion tanks in their inventory.

Judging from foreign press reports, the battle groups formed in an emergency situation can have a strength of up to 3,000 persons. It is proposed to include two or three infantry battalions, an artillery battalion, antiaircraft battery, and a reconnaissance, antitank, signal, engineer, supply, and transport company in their make-up. There is a total of 18 field artillery pieces, some 50 mortars, up to 80 antitank weapons and 9 antiaircraft guns.

In addition to the battle groups, in wartime separate infantry, armor and antitank battalions, artillery and antiaircraft artillery battalions, as well as support subunits will deploy in the field troops. They can be used as a reserve for the ground forces and as reinforcement for large units.

Local defense forces are intended for conducting combat operations on the territory of the military district where they are stationed, and for providing security and defense of military installations, individual populated points and important terrain sectors. They are manned by older military reservists (over 35). It is planned to deploy them in a period of 1-2 days during mobilization. Organizationally they are placed in infantry battalions, artillery battalions, and other subunits (antitank, engineer, signal, medical, logistic support). The bulk of the battalions (seven out of nine) are subordinate to the Western Command. Subunits are activated on a territorial basis. They are outfitted with military equipment and weapons, primarily obsolete models, and can have a varying organization. In peacetime they are basically attached to training-mobilization regiments and combat training of reservists is organized in the facilities of those regiments. In connection with rapid mobilization time periods and a good knowledge of local conditions, in a

Fig. 4. Organization of Danish mechanized infantry brigade



surprise enemy attack they can cover the mobilization and operational deployment of field forces and conduct combat operations together with the subunits of these forces.

The Army Home Guard represents a militarized organization manned on a voluntary basis for accomplishing secondary missions in Army interests. It is intended for the security of military (Fig. 6 [figure not reproduced]) and state installations, for fighting enemy landing forces and reconnaissance- raiding parties, performing reconnaissance, and organizing sabotage operations in the enemy rear. In peacetime the Army Home Guard along with the Air Force and Navy Home Guard are part of the Armed Forces Home Guard, which is headed by an Inspector. Army Home Guard subunits are operationally subordinate to military district commanders. They are manned on a territorial, voluntary basis by politically reliable persons who have reached draft age, and in some cases from age 16. Persons who have served in the Armed Forces, who have left the reserve because of age, and also who have been released from first-term service for any reason can be registered in the Home Guard. The maximum age for being in the Home Guard is not established by law. They keep personal weapons and ammunition at home or at work, and crew-served weapons are kept at alert assembly locations. Because of this the deployment time of Home Guard subunits is a matter of a few hours.

Organizationally the Home Guard consists of companies and separate platoons, of which there are around 550. According to their role, these subunits may beinfantry, antitank, reconnaissance, sabotage, or engineer and they can also perform missions of military police, security of military installations and so on. Their organization and arms depend on the missions assigned them. The Army Home Guard has a total of around 60,000 persons, of whom 8,000 are women. Home Guard subunits can perform independent missions or can act together with field forces and subunits of local defense troops. In the absence of an enemy, Home Guard subunit personnel continue labor activities at their place of work.

The Army is manned on the basis of universal compulsory military service and contract volunteer service. Draft age is 19. Volunteers can be recruited from age 17. Maximum length of first-term service of rank-and-file personnel is up to 12 months, and that of junior commanders is 24 months. For example, for rank-and-file personnel of mechanized infantry and armored combat units it is 12 months, antiaircraft artillery units 11 months, artillery units 10, and signal troops and individual specialties of engineer troops 9 months. Two kinds of contracts have been established for volunteers serving on a contract basis: short-term (for two years) and long-term with an opportunity for its repeated extension. The first is used for servicemen of combat units and subunits, and the second for servicemen of headquarters, support and special subunits.

Basic training for rank-and-file personnel is accomplished in training- mobilization regiments, and that of junior commanders in schools and training centers of the combat arms. Officer training is accomplished at the Copenhagen Officer School, in reserve officer schools and in a correspondence- course school. Reservist refresher training is organized in the facilities of training-mobilization regiments. While in the reserve, military reservists can be called up several times for refresher training for an overall length of 48 days.

Home Guard personnel usually train in their time off, but they also can be brought in for exercises and courses during working hours, for which compensation is paid

from the military budget. The Home Guard is manned by command personnel from among Army officers who have retired as well as from persons who have undergone special training in the Home Guard school or in courses. The length of training for Home Guard personnel is from 24 to 100 hours a year depending on the person's military training. The foreign press notes that due to the recently observed shortage of a trained reserve for field troops, Home Guard personnel and local defense troops can be used in individual cases for manning large and small units.

The western press indicates that the Armed Forces command authority intends to continue to focus primary attention in organizational development of the Army on modernizing basic arms, perfecting the command and control system, and improving field training and troop combat readiness.

French 4th Airmobile Division

18010358e Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 11, Nov 1988 (signed to press 10 Nov 88) pp 22- 23

[Article by Lt Col S. Duklov]

[Text] In plans for a further build-up of the fire and striking power of large and small units, and above all those which are part of the "Force d'Assistance Rapide," the Army command is giving great attention to perfecting their organization and establishment, outfitting them with modern weapons and combat equipment, and raising their level of combat training. This especially concerns their basic component, the 4th Airmobile Division.

ORGANIZATION. The foreign military press reports that this division was activated in 1985. In the specialists' assessment, it is not only one of the basic combat components of the "Force d'Assistance Rapide," but also the most mobile large unit of the French Army. It is intended above all for combating enemy tanks and other armored targets. It is made up of the 4th Headquarters and Support Regiment (Nancy); the 1st, 3d and 5th army aviation regiments stationed in Phalsbourg (80 km east of Nancy), Etain (40 km northwest of Metz) and Pau respectively; the 1st Airmobile Mechanized Infantry Regiment in Sarrebourg (65 km east of Nancy); and the 9th Airmobile Support Regiment in Phalsbourg. The division has a total of 6,400 persons and 241 helicopters: 90 SA 342 Gazelle antitank helicopters with the HOT ATGM, 27 SA 341 Gazelle fire support helicopters with 20-mm gun, 84 SA 330 Puma assault transport helicopters and 40 SA 341 Gazelle reconnaissance helicopters.

The headquarters and support regiment (around 1,500 persons) accomplishes missions of command and control and combat support of division units and subunits. It includes the following subunits: headquarters and service company, four squadrons of assault transport helicopters (11 SA 330 Pumas each), two reconnaissance squadrons (eight SA 341 Gazelles each), antiaircraft battery (12 20-mm antiaircraft guns) and a reconnaissance company.

Army aviation regiments (800 persons each) have an identical structure and are the division's principal striking force. Each of them includes eight squadrons (headquarters and service squadron, three antitank helicopter squadrons, one fire support helicopter squadron, one reconnaissance helicopter squadron, one assault transport helicopter squadron, and one logistic support squadron) and numbers 60 helicopters, of which there are 30 SA 342 Gazelle antitank helicopters with HOT ATGM's, 10 SA 341 Gazelle firesupport helicopters with 20-mm gun, 10 SA 330 Puma assault transport helicopters, and nine SA 341 Gazelle reconnaissance helicopters.

The airmobile mechanized infantry regiment (over 1,500 persons) is intended for engaging enemy tanks and other armored targets and for conducting reconnaissance and organizing air defense in the interests of army aviation regiments. It includes six companies (headquarters and service, three mechanized, and two engineer) and has in the inventory 45 Milan ATGM launchers, 12 120-mm mortars, and 14 20-mm antiaircraft guns.

The regiment can execute combat missions at full strength on the axis of advance or breakthrough of enemy tank groupings or with a portion of its personnel and equipment, covering individual terrain sectors.

The airmobile support regiment (around 1,000 persons) is intended for logistic support of division units and subunits during combat operations. It includes five companies: headquarters and service, supply, maintenance, medical, and transport.

In the French command's assessment, the division's present-day organization and its outfitting permit accomplishing combat missions with a sufficient degree of effectiveness. Specialists' calculations show that in one combat sortie the antitank helicopters can successfully engage up to 300 armored targets at a distance of 300 km from the opposing sides' line of contact.

COMBAT TRAINING. The western press reports that an improvement in the level of field training of division units and subunits is the primary direction in their combat training. To this end the training process is planned so that practicing various missions takes up most of the time. For example, around 50,000 hours a year are set aside for flight personnel of army aviation regiments (approximately 200 hours per crew), of which 6,000 are for flights under nighttime conditions.

Another aspect of combat training is the division's participation in exercises conducted under plans of command authorities of the Army and of the "Force d'Assistance Rapide." A wide set of missions involving practical employment of division units and subunits in various kinds of combat operations has been practiced in these exercises. For example, in April 1987 the "Force d'Assistance Rapide" command held a special tactical exercise with the division codenamed Damton-87 in which problems of lengthy overflights of the sea (around 700 km) with an intermediate landing and refueling aboard the carrier "Clemenceau" were practiced. Forty SA 342 Gazelle antitank helicopters and 16 SA 330 Puma assault transport helicopters were used in the exercise; they were broken into eight groups of seven helicopters each (five Gazelles and two Pumas), which took off from the Nimes Airfield (Southern France) at 40-minute time intervals. Outfitted with aircraft navigation equipment, the SA 330 Puma helicopters functioned as leaders in the flight, and they were also intended for search and rescue operations in case of air mishaps.

Capabilities of moving the division at full strength to the area of operational assignment in the southern FRG (over 1,000 km) were tested in the joint Franco-West German Exercise Kecker Spatz (1987). The western press reports that this required around 24 hours, after which combat missions werepracticed. In the specialists' assessment, the personnel demonstrated high professional training, especially in engaging enemy armored targets.

The foreign press reports that over the next few years it is planned to continue outfitting division units and subunits with modern arms (new helicopters of joint Franco-West German production, Mistral short-range surface-to-air missile systems and so on) in order to further increase its tactical capabilities.

Minefield Reconnaissance and Breaching Equipment

18010358f Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 11, Nov 1988 (signed to press 10 Nov 88) pp 23- 30

[Article by Col (Res) N. Zhukov]

[Text] Over the last decade there has been a sharp increase in the attention which armies of capitalist countries have given to land mines. Foreign specialists note that these mines have undergone serious qualitative changes resulting in a noticeable increase in their action and in the difficulty of detecting and disarming them. At the same time there have been substantial improvements in capabilities for high-speed laying of minefields as a result of the use of tube and rocket artillery, helicopters and aircraft. The tactics of laying such fields also have changed. Now they can be laid in a few minutes, and not only on the battlefield, but also a considerable distance away, determined by the means of delivery.

Modern principles of conducting combat operations provide for high troop mobility and a capability of moving quickly on the battlefield without delaying at barriers and obstacles troops encounter. Engineer formations are assigned the mission of ensuring necessary mobility for the ground forces. The presumed increase in number of minefields laid both on the battlefield and in the deep rear will considerably complicate combat engineers' execution of the combat mission. Outfitting armies with remote minelaying systems permits placing obstacles by surprise in extremely compressed time periods immediately on and ahead of the combat formations of enemy units. Therefore an acute need arises to ensure that troops who have ended up unexpectedly on mined terrain are capable of leaving this area independently and rapidly, without resorting to the help of engineer subunits and without losses, and continuing to execute the mission assigned them. To this end they are being equipped with appropriate means for detecting mines and breaching minefields, and personnel are being trained in rules of procedure in fields and in the use of authorized mine countermeasures equipment.

Articles on mine countermeasures tactics and equipment published in the foreign press in recent times point out that the above operations should be divided into four phases: minefield reconnaissance, mine detection in the identified field, clearing lanes in the field for passage of troops, and performing area mine clearance.

Minefield reconnaissance. This is performed most effectively by air and ground reconnaissance personnel and equipment. Ground reconnaissancepersonnel operate in groups on foot or in armored vehicles. The groups include combat engineers with appropriate gear for conducting surveillance and detection of mines. Fields laid by mechanized equipment, which leave easily visible parallel tracks on the ground from the minelayers, are detected most easily from the air. At the present time the armies of NATO countries are considering the possibility of employing infrared equipment installed in helicopters and drones for minefield reconnaissance.

Detection of mines in an identified field usually is done by engineer subunits and has the purpose of determining the type and dimensions of the minefield, which will permit making a decision on the method of breaching it. These operations usually are conducted in hours of darkness. Records show a diagram of the field, the number of rows or groups of mines in it, and the type of mines and their fuzes and give the minefield boundaries with maximum possible accuracy, especially the front boundary. Mines are detected by various kinds of equipment depending on the availability of time. Foreign military specialists emphasize, however, that up to the present time the use of mine probes and portable mine detectors remains the most reliable method (although

also very slow as well as dangerous for the personnel). In some cases it is considered possible to use roller-type mineclearing devices to identify the front and rear boundaries of the minefield.

*Clearing lanes in a minefield for troop passage*is deemed advisable to do manually in hours of darkness if the time and combat situation permit. That method is assessed as the most reliable. In the absence of such conditions, it is planned to clear lanes for combat vehicles and dismounted infantry by the mechanical or explosive method. In the future electromagnetic mineclearing devices will find use for destroying mines with proximity fuzes.

Area mine clearance usually is done in the rear when there is no enemy pressure and when time periods are not determining. In this instance, too, it is planned to use the manual method of disarming mines supplemented by mechanical mineclearing. The latter method may be required in clearing mines from important installations in rear areas (airfields, highway and rail junctions, depots and bases) which were mined using remote means. To clear them fastest it is proposed to use mechanical mineclearing devices, and above all the flailing-type mineclearing devices, which again have begun to become prevalent.

Mine reconnaissance equipment in the inventory of foreign armies presently is represented by portable mine detectors of two primary classes—for detecting mines having metal components and for detecting mines that are completely nonmetallic. The former detectors are in the absolute majority and the latter exist in limited numbers inasmuch as they are insufficiently effective and far from completely satisfy troop requirements. All these portable type devices are designed for use by one operator. The work of creating mobile mine detectors mounted on ground vehicles and intended for reconnoitering troop movement routes has been carried on for a long time, but foreign armies presently do not have such equipment.

A considerable number of portable mine detectors have been developed in recent years. The characteristics of some of them are shown in the table.

Specifications of Portable Mine Detectors

Model Name, Country-Developer	Weight of Portable Part, kg	Antitank Mine Detection Depth, cm	Width of Reconnoitered Strip, m	Continuous Operation, hours[1]
AN/PSS-12, USA	4	35	2	70
AN/PSS-11, USA	3.7	35	2	50
AN/PRS-8, USA	3.8	15	2	20
AN/PRS-7, USA	4	15	2	25
Type 240, UK	2.1	70	1.5	40
NMD-78, UK	3	15	1.8	80
L4A1, UK	4.5	50	.	30
MD2000, UK	4	80	.	10
FEREX 4.021, FRG	5.5	40	1.5	35
METEX 4.125, FRG	3.5	70	2.5	80
DHPM-1A, France	3.5	45[2]	1.8	30
BMD-34, Israel	2.9	30	.	25

1. This means the service life of the power source.
2. Detection depth of 10 grams of aluminum parts.

The *American AN/PSS-12 induction-type pulsed mine detector* (Fig. 1 [figure not reproduced]) is designed for detecting mines having small masses of metal components. It has a square detector head attached to a telescopic rod. The electronic unit is made in the form of one easily replaceable module, contained along with a new lithium power source in a common case attached to the opposite end of the rod. In contrast to the old model which it is replacing (AN/PSS-11), this instrument has greater operating sensitivity and reliability and its power source provides 1.5 times greater length of continuous operation. The new mine detector is in series production and over the next few years will become the primary instrument for detecting mines in U.S. Army and Marine units.

The *American AN/PRS-8 radio-frequency mine detector* (Fig. 2 [figure not reproduced]) is an improved version of the standard-issue AN/PRS-7 mine detector. Like the latter instrument, it can be used for hunting mines which do not have metallic parts. Its action is based on the principle of registering the difference in dielectric constant of the soil and an object in it. The circuit diagram includes a 16-bit microprocessor for processing the reflected signals received. The instrument's work mode changes automatically in accordance with a change in the nature of the soil. The electronic unit is made with integrated circuits and powered from a lithium source. The mine detector has been adopted by the U.S. Army. In the first half of the 1980's it was planned to convert some 9,500 AN/PRS-7 mine detectors to this version.

The firm of Arado Electronics in Great Britain puts out the *Type 240 induction-type pulsed mine detector* (Fig. 3

[figure not reproduced]). It is a highly sensitive instrument capable of detecting objects with a very small mass of metal. It has a detector head of several round loops fastened to a telescopic rod. At the opposite end is an electronic unit with power source and handle, which accommodates a needle indicator supplementing the headphones. This instrument is characterized by rather reliableneutralization of spurious signals from different soils. The mine detector has been adopted by the British Army. It was used in the work of clearing minefields on the Falkland (Malvinas) Islands.

Another *British radio-frequency mine detector, the NMD-78,* is designed to detect mines with or without metallic components. It has a transmitting and receiving unit and a device for an automatic sensitivity adjustment in accordance with a change in the nature of the soil. It is equipped with a microprocessor for processing signals being received.

The British Army also uses the *No 4C induction-type mine detector* developed in the late 1960's. Its electronic circuit is made with semiconductors. The instrument has a device for adjusting sensitivity, which is important in working in soils having different metallic inclusions (including ammunition fragments). The *L4A1 induction-type pulsed mine detector* (Plessey P6/2) is more advanced. It includes a set of interchangeable detector heads of different shape and sensitivity. It can be used to hunt not only mines, but also weapons and explosives.

Armies of 12 capitalist countries were supplied with the British *MD2000 pulsed mine detector.* Its interchangeable detector head is made in the shape of a ring.

The *West German FEREX 4.021 mine detector* is designed to detect only ferromagnetic objects. Its high sensitivity permits using it to detect mines and bombs at considerable distances. The detector head is made in the shape of a long cylinder (probe) connected to a tubular rod to which an electronic unit and power source are attached. This mine detector can be used to detect metallic objects in the water. The probe's airtightness permits this to be done at a depth down to 30 m.

Another *West German induction-type mine detector, the METEX 4.125,* is considered to be general-purpose inasmuch as it is designed for detecting mines encased in any material but having small metallic inclusions. It can be used to detect an antitank mine buried at a depth down to 70 cm.

The *DHPM-1A induction-type pulsed mine detector* (Fig. 4 [figure not reproduced]), which permits detecting antitank and antipersonnel mines having at least one metallic part, is in the French Army inventory. The *Israeli BMD-34 mine detector,* which can be used to detect mines in any soils including those containing ferrite inclusions, is made in a similar manner.

The *American AN/VRS-5 model,* still in a testing stage, is noted among the mobile mine detectors. It is designed for high-speed reconnaissance of mines on roads and airfields. The detector head (a package of parallel antennas resting on rollers) is mounted on a frame ahead of a vehicle (the M113 APC). It is connected with an electronic control and data processing unit inside the vehicle, where a display device screen also is located. The vehicle will move at a speed up to 13 km/hr when performing reconnaissance.

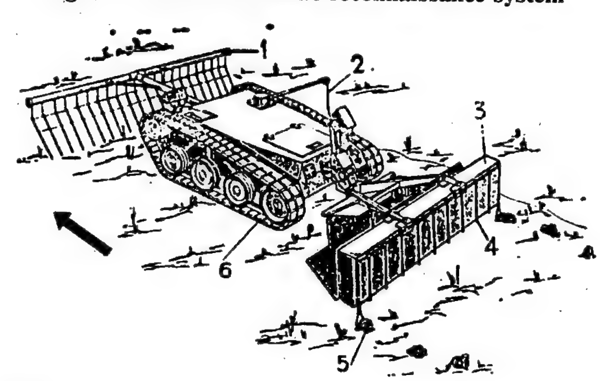
At the present time American specialists have begun creating the *MIRADOR (Minefield Reconnaissance and Detector System) mobile mine detector,* the basis of which is a remotely controlled vehicle equipped with necessarysystems for detecting metallic and nonmetallic mines, as well as equipment for transmitting data to a control vehicle (Fig. 5 [figure not reproduced]). It was planned to begin demonstration tests of system prototypes this year.

The *West German MSG-1 mobile mine detector* is in the prototype stage. Its detector head is attached approximately 1 m from the front of a jeep-type light vehicle. It has a system for automatically stopping the vehicle when a mine is detected.

Another similar *West German mobile mine detector, the ML 1750,* already is in the inventory of armies of a number of capitalist countries.

FRG specialists now have begun developing a *mobile mine reconnaissance system* (Fig. 6), the basis of which will be a remotely controlled vehicle (a light tracked vehicle with a low silhouette) outfitted with the following equipment:

Fig. 6. West German mine reconnaissance system



Key:

1. Mineclearing device	4. Marking device
2. Light guide	5. Fluorescing foam
3. Detector head	6. Base vehicle

—A mine detector operating on a radar principle and capable of detecting metallic and nonmetallic mines on the surface of the soil or buried down to 40 cm. It has a detector head allowing mine reconnaissance in a strip of around 3 m;

—A marking device for denoting the reconnoitered lane and detected mines (marking is accomplished by a fluorescing foam of two colors extruded onto the soil;

—Television gear including three video cameras (one is used for observing the mine detector head and the two others for vehicle control);

—A hydraulic system for controlling all equipment, including automatic retention of the detector head at a constant height from the surface of the ground.

The control vehicle will be a standard-issue APC with two operators: one for controlling the movement of the vehicle sent out ahead (from a monitor which receives a television picture of the terrain), and the other for observing the progress of mine detection, registered on a three-dimensional display.

Minefield breaching equipment is subdivided by foreign military specialists into two basic categories, mechanical and explosive, which supplement the traditional manual method of disarming detected mines. The latter continues to be used in practically all foreign armies inasmuch as it is considered the most reliable.

In recent times mechanical means (mineclearing devices) have become widespread. The explosive method also continues to be perfected, primarily through the use of distributed mineclearing charges. The United States isworking to create mineclearing equipment which uses fuel-air explosives.

The *American TMMCR roller-type minecleaning device* (Fig. 7 [figure not reproduced]) is wheeled and is in the inventory of U.S. Army tank subunits (one per tank company) stationed in Europe and in Marine units (two per tank company). This equipment is mounted on series M48 and M60 tanks, and in the near future (after development of a special attachment kit) also on M1 Abrams tanks. It has two independent minecleaning roller units with a draw bar and can be mounted on a tank by the crew in 15 minutes using two manual winches. The equipment can be released from the tank immediately. The blast resistance of the rollers permits up to two M15 antitank mines to be detonated beneath each one.

The *American TWMP blade-type minecleaning device* is wheeled and is mounted on series M60 tanks. It is in the inventory of Army and Marine engineer units. It has two minecleaning units fastened to push rods and consisting of a short bulldozer blade with five vertical blades fixed in its lower part. The bars are hinge-mounted on the tank's coupling assembly and have pyrotechnic cartridges for rapid release of the equipment from the vehicle. In clearing mines the vertical blades work into and cut through the ground to a depth down to 25 cm. Mines which are encountered slide along the edge of the vertical blades, come to the surface, and are displaced away from the vehicle's running gear by the bulldozer blade. Skids attached to the bulldozer blades help trace terrain irregularities.

The *British EMP blade-type minecleaning device* is also wheeled and used with the AVRE combat engineer tank, line tanks, and the FV 4205 armored vehicle launched bridge. It is similar to the American model in design, but it has seven vertical blades in each unit and is adapted for clearing mines on hard-surface roads and on runways, for which there are provisions for attaching light bulldozer equipment blades to it for displacing scattered mines to the side.

The *Israeli Ramta blade-type minecleaning device* served as the prototype for the aforementioned American model. It is in the Israeli Army inventory and is adapted for suspending to any tank (Fig. 8 [figure not reproduced]). A steel chain is hung between its minecleaning units and serves to actuate mines with a rod-type fuze which may be between the tracks of the running gear. Israel presently is developing the *TACOS blade-type minecleaning device*, intended for clearing continuous lanes in minefields up to 6 m wide. It is planned to fasten a double-bladed minecleaning working member with vertical blades to short push bars. It is planned to use such equipment on tanks and on the obstacle-clearing engineer vehicle being developed in the United States. Tests of the first experimental models of the new minecleaning device now are being conducted, with American specialists taking an active part.

The *West German LSM flail-type minecleaning device* (Fig. 9 [figure not reproduced]) is undergoing tests. It is being created jointly with French specialists. The working equipment is a set of wedge-shaped flails fastened to a rotating shaft; on impacting the ground the flails strip the soil away and throw it aside together with mines that are encountered. In the travelling position the frame with mounted shaft folds back onto the vehicle roof.

The *British JSFU Mk 3 flail-type minecleaning device* operates on the very same principle as the West German model. It can be used to clear lanes in minefields laid in or on the soil. The working member has a rotating shaft with a set of chains of varying length and flails. When the shaft rotates, the flails and chains deliver glancing blows to the soil, throwing aside mines on the surface and actuating buried mines. Tests conducted by the developing firm have shown that the working member is capable of withstanding the explosion of mines with an explosive charge up to 3.5 kg. A tank (Fig. 10 [figure not reproduced]) or special wheeled-tracked chassis with armored cab serves as the mineclearer's base. The new minecleaning vehicle, which was used by the British Army in the Falkland (Malvinas) Islands, has been purchased by armies of a number of countries of Africa and the Middle East and it is being tested in the United States.

U.S. Army engineer subunits have several types of distributed minecleaning charges, including the M157, M3A1 and M173 in the inventory. Series production of a new model, the M58A1 (previously designated MICLIC), presently has begun.

The *M157 demolition snake* is an advanced model of the obsolete M3A1 distributed charge. It is fed onto a minefield by a tank, which then departs to a safe distance after unhooking and fires a machinegun at the charge's explosive device. A ditch 1-1.5 m deep forms when it detonates.

The M173 is a rope with cylindrical charges of plastic explosives strung on it. It is placed on the field using a solid-propellant rocket.

The *American M58A1 distributed mineclearing charge* is used to clear lanes in enemy minefields for tanks and other combat vehicles. The charge is a series of cylindrical blocks of plastic explosives strung on a line. It is stowed in a special container on a single-axle trailer and fed onto the minefield by a solid-propellant rocket launched from a short rail attached to the tailboard (Fig. 11 [figure not reproduced]). The trailer is towed by a tank. The charge is 107 m long overall and it weighs 850 kg. Its dimensions and explosive force provide for clearing a lane 8 m wide and 100 m deep in fields of antitank track-disabling mines. It is planned to purchase around 1,400 M58A1 charges for the U.S. Army.

The *British Giant Viper distributed mineclearing charge* is designed similar to American models. The charge is in a container on a special trailer transported by a tank, APC or the FV 180 engineer close-support vehicle. It is fed onto the minefield by a cluster of eight rockets. Width of the cleared lane reaches 7 m, and the depth is around 180 m.

Foreign specialists consider fuel-air munitions to be a promising mineclearing means. For example, the United States created and tested the *SLU-FAE rocket mineclearing system*, with which a lane 8 m wide and up to 300 m deep can be cleared in a minefield. It is a 30-tube self-propelled system having munitions which are rockets with a warhead filled with liquid propylene oxide. The free-flight rockets are fitted with brake chutes for subsequent distribution over the entire depth of the minefield.

Work on the SLU-FAE system presently has been suspended. American specialistsare conducting tests of another *rocket mineclearing system, the CATFAE* (Fig. 12 [figure not reproduced]), which also uses fuel-air munitions for clearing lanes in minefields. This system was created for Marine units, to be used in conducting amphibious landing operations.

The basis of the CATFAE system is a launcher with rockets (21 munitions) accommodated in the assault compartment of the LVTP-7A1 amphibious tracked transporter. The launcher is made in the form of three banks of seven tubes each. To clear a lane in a minefield the rockets are fired successively; each of them is designed for initiation at a strictly defined point on the trajectory and on the same line, which should ensure clearing a lane of the requisite depth. This system is used to clear a lane 20 m wide and 300 m deep. It is planned for adoption in the early 1990's.

In addition to the aforementioned mineclearing equipment, capitalist countries are attempting to create more effective models possessing the best capabilities and mineclearing reliability. The integrated use of several mineclearing means is planned for this purpose. The ROBAT remotely controlled vehicle being developed in the United States can serve as an example of such a solution. It will be equipped with a roller-type mineclearing device and two sets of M58A3 distributed charges as well as a device for marking the boundaries of the lane being cleared. Israel is developing the CLEWP equipment for clearing lanes up to 150 m deep. This is a tank with a mineclearing device and a distributed charge laid in the narrow lane made during the vehicle's movement and then detonated, by which a continuous lane is created for combat vehicles.

Role and Place of Fighter Aviation in Air Defense

18010358g Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 11, Nov 1988 (signed to press 10 Nov 88) pp 31- 37

[Article by A. Krasnov, doctor of military sciences, professor]

[Text] Reactionary militarist circles of the United States and other NATO countries do not wish to reconcile themselves with positive processes which have begun in the sphere of disarmament. Cloaking themselves in hackneyed slogans about the "Soviet military threat" and the "decisive superiority of Warsaw Pact countries in conventional arms," they continue to build up the might of their war machine. Along with the development of striking forces, NATO pays great attention to improving the air defense system, in which fighter aviation is one of the active components.

According to views of western specialists, the role and place of fighter aviation in air defense systems are determined by features of the military- geographic position, the political and economic importance of specific areas and installations, and the combat performance characteristics and capabilities of the fighters and other personnel and equipment included in air defense. Economic factors and the development level of each country have a significant influence on the role and place of fighter aviation. In studying this question they concluded that changes in the above factors, especially in combat capabilities of surface-to-air missile [SAM] systems and fighters (which are developing at far from identical rates), from time to time give rise to a reassessment of their role and place in air defense systems. The foreign press notes that the amplitude of such changes has been very broad, from recognition of fighter aviation

as the primary means of air defense to its total rejection. During World War II and subsequent wars fighters played a deciding role and formed the basis of air defense of many states before the appearance of SAM's. In repelling enemy air raids they would operate both on distant approaches and immediately over the defended installations. Antiaircraft artillery [AAA] was in second place, although its effectiveness gradually increased. For example, while the AAA of all belligerents in World War I accounted for approximately 15-20 percent of downed aircraft, in World War II this figure was already 40 percent.

The SAM systems coming to replace AAA initially were only a means for reinforcing fighter aviation. Subsequently their role rose quickly. For example, in local wars in Vietnam and the Near East they destroyed (together with AAA) around 90 percent of all downed airborne targets. Such high effectiveness of operations by SAM systems led to a reassessment of the roleand place of fighter aviation in air defense systems. New theories of air defense organization began to appear in the West in which fighters were given more than a modest place. It was preferred to employ them only to cover secondary areas not protected by SAM systems. For example, French Army Gen A. Beaufort declared: "Be that as it may, it is now clear that aviation no longer can play the deciding role in air defense of installations when powerful missile cover has been provided for them." There were many persons of like mind, but opinions of other military theorists were not as categorical and the "antifighter" views and theories did not live for long. Subsequently they were revised in the direction of a balanced development of SAM's and fighters, but the role of aviation still dropped to some extent.

In particular, as the foreign press reported, the number of fighters in the U.S. air defense system was reduced by almost two-thirds by the early 1970's in comparison with 1965. Only two of four fighter squadrons remained in the FRG. Only the British command maintained the previous position, asserting that so long as the enemy had attack aircraft in the inventory UK air defense would be based on deployment of fighter-interceptors. According to foreign press publications, even today military leaders and specialists in different countries do not agree on an assessment of the role and place of fighter aviation in air defense systems. At times their opinions are poles apart.

In comparing characteristics of fighters and SAM systems, proponents of SAM weapons conclude that the time spent closing with targets flying at supersonic speed is almost twice as long for fighters as SAM's even with the highest readiness for takeoff (30 seconds). Therefore fighter aviation requires a considerably greater range of target acquisition than SAM systems to achieve the very same effectiveness of combat operations. Establishment of an early warning system is fraught with certain technical difficulties and will give rise to large expenditures. Noting the high accuracy, rate of fire, and operating reliability of SAM systems, some foreign theorists believe that the priority role in engaging the air adversary is shifting forever from fighters to SAM systems. The positions of these theorists find support in countries where SAM systems presently hold a leading place.

Supporters of fighter aviation assume that although SAM weapons do possess a higher degree of combat readiness and other advantages, they are incapable of engaging a large number of enemy aircraft operating with a high density without bringing in fighters, since the SAM systems have limited capabilities for simultaneous engagement of targets. Moreover, SAM systems have limitations in the range of fire and their missiles have g-load limitations. They still are insufficiently effective in engaging vigorously maneuvering aircraft. Therefore the probability of hitting such targets compared with targets that are not maneuvering drops appreciably and as a rule is below the calculated value.

In their opinion, fighter aviation is more mobile and to a considerable extent is devoid of the aforementioned deficiencies of SAM systems. Fighter tactics are more flexible and ensure their use in any area in a wide range of altitudes and with a swiftly changing combat situation and enemy tactics. In this sense the grouping of air defense SAM weapons is in a worse position. It has less mobility and cannot avoid an attack quickly inasmuch as considerable time is required (often exceeding the overall duration of an enemy air attack) for closing up combat formations, relocating to a new area and then deploying.

Proponents of fighter aviation believe that in contrast to SAM systems, it has sufficient capabilities for maneuvering personnel and equipment over great distances. For example, using fighters alone it is possible to promptly concentrate air defense efforts on the axis of the enemy's main attack, provide cover for the flanks of a friendly troop grouping, and for a certain time close breaches which have formed in the air defense system. Among the advantages of fighters over SAM systems these proponents mention aviation's capability to monitor larger volumes of air space and determine the nationality of targets more reliably.

Foreign specialists emphasize that initiative in choosing the time and direction of attacks rests with the enemy. He will penetrate the air defense system wherever it is advantageous to him, particularly in sectors most lightly covered by SAM weapons and in narrow sectors of the front. Therefore air defense personnel and equipment will be forced to operate under conditions of considerable uncertainty, and only that portion of SAM systems in the penetration area will take part in repelling the attacks. In that situation only fighter aviation can execute a swift maneuver to concentrate its forces in the threatened sector and thus cover mistakes in predicting possible enemy actions.

The western press notes, however, that there is no argument at all about a mutually exclusive, monopoly employment of SAM's or fighters. In their studies and recommendations, foreign theorists are unanimous that air defense must be organized as a unified system with both SAM systems and fighter aviation in its makeup.

As already mentioned earlier, these questions are decided in different ways depending on geographic position and other factors. For example, fighter- interceptors make up the basis of U.S. and Canadian air defense. They are assigned to cover the most important administrative and political centers, command and control entities, and air and sea lines of communication against air attack. In European countries of NATO, however, these missions usually are distributed between air defense aviation and SAM units.

The foreign press reports that all NATO countries presently are giving serious attention to increasing the combat capabilities both of SAM systems and of fighter aviation, to organizing their employment under a unified concept and plan, and to perfecting their system of command and control.

New jam-resistant Patriot SAM systems with a high firing accuracy are coming into the inventory of air defense forces of the United States and FRG. Each system is capable of engaging up to nine targets simultaneously. It is planned to deliver these systems to armed forces of the Netherlands, Denmark, Belgium and other NATO countries. R&D is being conducted to create advanced SAM systems using the latest technology.

The aircraft inventory of fighter aviation also is being constantly improved. The improvement in its combat capabilities is proceeding chiefly as a replacement of obsolete aircraft with more advanced aircraft and as a phased modernization of fighters in the inventory.

In particular, in the United States air units and subunits of air defense ofthe regular Air Force, of the Reserve command and of the Air Force National Guard, which have F-106 and F-4C fighters in the inventory, are being outfitted with F-15 Eagle heavy all-weather fighters (Fig. 1 [figure not reproduced]) and with the light, maneuverable F-16 Fighting Falcon (Fig. 2 [figure not reproduced]). At the same time these aircraft (F-15 and F-16) are being adapted for employing new all-aspect AIM-120 guided missiles with active radar homing heads. In France obsolete Mirage-3C and Mirage-F.1C fighters are being replaced by the Mirage-2000 (Fig. 3 [figure not reproduced]). Aviation of UK air defense has begun to be reoutfitted. The Lightning-F.6, Phantom- FG.1 and Phantom-FGR.2 fighters in its inventory are being replaced with Tornado-F.3 fighter-interceptors with on-board multifunction radars. A program for modernizing F-4F Phantom II air defense fighters is being completed in the FRG. New AN/APG-65 on-board radars are being installed in them which permit intercepting airborne targets at all altitudes and at essentially any aspect. Reoutfitting of air units and subunits of air defense with new F-16 fighters has concluded in air forces of the Netherlands, Belgium, Norway and Denmark.

Western military experts estimate that after the conclusion of these and other measures, by the early 1990's the combat capabilities of fighter aviation will sharply increase and this in turn will influence the role and place of fighters in the organization of air defense.

In the organizational development and improvement of modern air defense systems abroad, the assumption is made that not one of the kinds of weapons created to date can ensure reliable cover of friendly installations against all air attack weapons at the enemy's disposal. To accomplish this mission it is necessary to have a precisely organized coordination of different types of weapons within the framework of a unified air defense system. At the same time, joint actions of fighters and SAM systems introduce certain restrictions to the combat capabilities of each of them, especially with an imperfect identification system. When fighters enter the SAM envelope their freedom of action is limited and, as the experience of local wars has shown, the probability of shooting down friendly aircraft increases. To avoid such instances in armies of NATO countries, it is planned to employ air defense fighter aviation and antiaircraft weapons separately by zones of responsibility. SAM subunits are used to engage targets in their own zones of responsibility, while fighters intercept the targets in zones not covered by SAM system fire.

As NATO military specialists note, however, such interworking inevitably leads to reduced effectiveness of the air defense system. They believe that it is illogical to deny coordination in one zone, but how can the efforts of fighters and antiaircraft weapons be consolidated and how can their mutual limitations be eliminated? More and more attempts are being made to solve this problem and technical and organizational measures are being carried out. In particular, work is being done to perfect the system for monitoring air space so as to ensure more lengthy display of the situation at command posts; new methods are being developed for optimum distribution of forces by targets; and altitudes and the time when a weapon can be employed without limitations are being established for each weapon. As the foreign press attests, however, the problem has gone unresolved for many years.

Meanwhile western military experts note that processes of the air adversary'sengagement by fighters and SAM systems are beginning to resemble each other more and more. For example, targets are acquired by radars of air defense system control posts and identified using the identification-friend-or-foe equipment, after which a target designation is issued both to fighters and to SAM guidance radars. Then the targets are placed on automatic tracking by pilots and SAM system crews and the targets are destroyed after entering the kill zones of air-to-air missiles or SAM's. The difference is only that

fighters close rapidly with the enemy and have to receive target designation from a ground or airborne command post, while SAM systems have individual target designation equipment. NATO specialists believe that a certain uniformity of fighter and SAM subunit battles is taking shape in this manner. As a result, broader opportunities are appearing for organizing their joint operations. The tactics of fighter aviation when interworking with SAM weapons are above all the tactics of a joint battle conducted under a single concept, a battle in which the two systems must supplement each other.

Based on the above and in an attempt to forecast the future, NATO military experts assert that the role and place of fighter aviation will be determined chiefly by the following basic trends in development of the air defense system: a further increase in combat readiness, the striving to increase the range for detecting and engaging the air adversary, and an increase in the stability and survivability of the air defense system.

Further increase in combat readiness of air defense systems. It is believed that while having sufficient numbers even of the most sophisticated combat equipment and trained personnel, air defense systems simply will not be able to offer necessary opposition to the enemy and will be caught unawares if existing time periods for placing air defense personnel and equipment in readiness remain unchanged.

The trend toward increased combat readiness assumes special significance for fighter aviation, which in comparison with SAM weapons spends considerably more time destroying targets. In order not to be in a secondary role in repelling massed enemy air raids, its combat readiness must be radically improved. This is reflected in intensive searches for ways to reduce time periods for the takeoff and most rapid mass commitment of fighters, as well as in their outfitting with weapons enabling them to fight brief but productive battles with maximum intensity. The latter can be assured by the capability of having on-board sights lock onto and track a large number of targets simultaneously and destroy them in one attack. Here the fighters' total time in the air will be reduced and they can be readied for repeat sorties faster.

In addition, the foreign press emphasizes that air defense personnel and equipment can be placed in combat readiness promptly and fighter aviation can be sent up in advance if enemy aircraft, flying chiefly at high speed and extremely low altitude, are detected earlier than at present.

A striving to increase the range of detection and destruction of the air adversary always was one of the principal directions of air defense system development. As the foreign press reports, however, considerably more attention has begun to be given to this problem since precision weapons, especially long-range air-to-surface missiles, have entered the aviation inventory.

This trend shows up most clearly in the United States, where the existing airborne early warning and aviation control system (the AWACS system) is being constantly improved and fundamentally new reconnaissance assets are being developed—over-the-horizon radars and space-based radars. According to American specialists' calculations, their integrated employment will permit forming a broad outer field around the North American continent and promptly warning the air defense system about the flight of an opposing side's air attack weapons.

The E-3A airborne early warning and control aircraft make up the basis of the AWACS system. Such systems are deployed in Europe within the framework of the NATO Allied Armed Forces (18 E-3A aircraft, Fig. 4 [figure not reproduced]) and in Saudi Arabia (5 E-3A's). Great Britain and France decided to purchase E-3A aircraft (eight and six respectively) in the United States to establish AWACS systems on their territories. American E-2C Hawkeye aircraft are being used in Japan, Egypt and Israel to accomplish early warning and control missions.

Foreign specialists do not see other air defense means except fighters with regard to engaging the air adversary on distant approaches to defended territory. It is planned to increase their effective range by controlling them from airborne command posts, the functions of which are assigned to the aforementioned AWACS system aircraft. Moved up to primary avenues of enemy air raids which have been determined in advance, these aircraft will create favorable conditions for successive commitment of fighters on distant lines and will promote the organization of coordination between fighter aviation and SAM systems.

In addition, the importance and irreplaceability of fighter aviation in air defense systems are determined by its capability to conduct independent combat operations with limited information on the air situation and execute a swift maneuver from one sector to another if events should develop in such a way that the disposition of air defense personnel and equipment will no longer sufficiently conform to the situation at hand.

Increase in stability and survivability. According to the views of foreign specialists, this trend is the result of growing capabilities of the opposing sides' aviation to neutralize various elements of air defense systems by fire and electronics. The latter is determined by the fact that various electronics are used and will be used in any air defense system and it is difficult to conceal their emissions from enemy reconnaissance even in peacetime. When an air attack begins to be repulsed, the air defense systems reveal themselves even more by switching on numerous radar and communications equipment and they will become convenient targets for precision weapons which home on radiation sources. In addition to the electronic equipment, airfields and SAM and AAA positions will be under attack. Western military experts believe that in order to improve the survivability of

fighter aviation on airfields, the need remains for situating aircraft and logistic support resources in sturdy shelters and for constructing alternate runways. In their opinion, even under present-day conditions there is emphasis on organizing the fastest scramble of primary fighter forces from airfields against which the delivery of strikes is expected, and on their active operations against enemy air attack weapons, above all to engage EW aircraft, platforms for antiradiation and other air-to-surface missiles, and elements of enemyreconnaissance-attack systems. Prompt destruction of the most dangerous targets, in which a deciding role is given to fighter aviation, will permit preserving the survivability of the entire air defense system and thus preventing or considerably weakening enemy strikes against defended installations.

In the conclusion of the majority of foreign military specialists, fighter aviation is the most maneuverable and longest-range air defense resource. It plays the deciding role in a battle against the air adversary on distant approaches to defended installations and where SAM systems are less effective. Its zone of operations is located in areas which cannot be reached by SAM weapons and, if necessary (with a high density of enemy raids), it is located in those zones as well.

British Harrier-GR.5 Fighter

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[Article by Col D. Velichko, candidate of military sciences]

[Text] The Harrier-GR.5 tactical V/STOL fighters (Fig. 1 [figure not reproduced]), which differ from aircraft of the preceding modification, the Harrier-GR.3 (their comparative characteristics are given in the table), by an increased radius of action and the capability of carrying a considerably larger combat payload, have been coming into the Royal Air Force inventory since July 1987. The Harrier-GR.5 fighter (developed by the British firm of British Aerospace together with the American firm of McDonnell Douglas) is intended for giving close air support to ground forces and performing aerial reconnaissance.

Comparative Characteristics of Harrier-GR.3 and GR.5 Fighters

Characteristics	Harrier-GR.3	Harrier-GR.5
Weight, kg:		
—empty aircraft	6,140	6,250
—maximum takeoff	11,430	13,500
—maximum combat load with short takeoff run	3,600	4,170
—maximum combat load with vertical takeoff	2,300	3,000
—fuel in integral tanks	2,295	3,500
—fuel in external tanks	2,400	3,700
Maximum flight speed:		
—Sea level, km/hr	1,180	1,100
—high altitude, Mach	1.3	1.1
Takeoff distance with short run and maximum takeoff weight, m	305	370
Ferry range without aerial refueling, km	3,425	3,825
G-load limitations	+7.8;-4.2	+7;-2.8
Aircraft dimensions, m:		
—length	13.89	14.12
—height	3.63	3.55
—wingspan	7.7	9.25
—wheel track	6.76	5.18
Wing area, m^2	18.68	21.37

Judging from foreign press reports, it is planned to buy 96 Harrier-GR.5 aircraft for the Royal Air Force. The program envisages producing 328 fighters for U.S. Marine Aviation (300 single-seat AV-8B's and 28 two-seat TAV-8B combat trainer aircraft). In addition, deliveries of the new aircraft also are planned to third countries. In particular, the Spanish Navy, which has deck-based AV-8A Matador fighters in the inventory, ordered 12 AV-8B's (in Spain they were designated the EAV-8B). The Italian Navy also is showing some interest in the new fighter.

The design of the Harrier-GR.5 is that of a cantilever monoplane with high-set sweptback wing, single-fin tail unit and bicycle landing gear (see color insert [color insert not reproduced]). Its feature is considered to be extensive use of composite materials in the design with a proportion of 26.3 percent. The wing is nonremovable. Compared with the Harrier-GR.3 wing, it has a thicker supercritical section with a thickness/chord ratio of 11.5 percent at the root and 7.5 percent at the tip. The wingspan and area also are increased by 20 percent and 14.5 percent respectively. The wing leading- edge sweep was reduced by 10 percent. The wing was made basically of composite materials, particularly those elements such as the main multispar torsion box, ribs, skin, flaps, ailerons, and outrigger fairings. The leading and trailing edges of the wing and tips are made of aluminum alloy.

In the opinion of British specialists, the increase in area of the wing and tips as well as use of drooping ailerons which tilt to a certain angle depending on the position of the engine's jet nozzles, significantly improved the aircraft's characteristics when used with a short takeoff. At the same time, the innovations introduced to the wing

design led to a growth of drag, which was the basic reason for a reduction in maximum flight speed by almost 80 km/hr compared with the Harrier-GR.3. It is assumed that this speed reduction can be cut by making slight changes to the connection of the wing and fuselage and in the design of engine air intakes.

The fuselage is somewhat longer than that of the Harrier-GR.3. Its nose is made basically of composite graphite epoxy material and the central and rear sections are of aluminum alloy. The two underfuselage heat shields and a small panel in front of the windshield are made of titanium. A kind of "box" consisting of two rigidly fixed longitudinal strakes and a retractable transverse flap can be installed below the central fuselage between the nose strut and main landing gear struts. The strakes are attached to the gun mount pods and the transverse flap is accommodated behind the nosewheel strut. During vertical takeoff and landing the "box" traps part of the exhaust gases reflected from the ground and as a result an air cushion forms contributing to an increase in a lift of approximately 500 kg.

The single-seat cockpit of new design with air conditioning is completely made of composite materials. The pilot's seat is situated 30.5 cm higher than in the Harrier-GR.3. A good all-around view is achieved because of this and due to use of a new canopy.

The tail unit has a single fin and a variable-incidence tailplane. The fin and the leading and trailing edges and tips of the tailplane are made of aluminum alloy; the rudder, trimming tab and basic part of the tailplane are of composite graphite epoxy material. The landing gear consists of twoventral main struts and two outriggers. The latter are set approximately in the middle of the wing panels. Multidisk brakes of composite carbon material are used in the landing gear brake system. Pressure in tires on the ventral struts is 8.79 kg/cm^2. Landing gear struts have been strengthened in connection with an increase in the new aircraft's operating weight.

The power plant consists of one Rolls-Royce Pegasus Mk 105 vectored thrust turbofan engine (maximum static thrust 9,870 kg-f). There is a provision for a brief (4 second) transfer of the engine to higher temperature operating conditions in a vertical landing. Compressed air from a high pressure compressor is used for supplying the flight control system, on-board oxygen system, and for cockpit pressurization. The fuel system basically is similar to that of the Harrier-GR.3 fighter, but because of an increase in capacity of wing fuel tanks the overall capacity of the new aircraft's integral fuel tanks reaches 4,200 liters, which is 45 percent greater than for the Harrier-GR.3. In addition, four 1,135 liter external fuel tanks can be suspended on the Harrier-GR.5. There are provisions for aerial refueling.

Electronic equipment includes HF and V/UHF jam-resistant radios, Cossor IFF 4760 radar identification gear, landing system receiver, TACAN short-range navigation equipment, digital air data computer, Ferranti FIN 1075 inertial navigation system, electro-optical head-up display, and a Hughes Aircraft weapon control system supporting the use of various guided weapons, including with television and laser guidance systems (Fig. 2 [figure not reproduced]). The aircraft also is fitted with an integrated electronic surveillance and electronic countermeasures system which includes the AN/ALR-67(V)2 warning receiver, an active jammer, and the AN/ALE-40 chaff and IR decoy dispenser. There is a place below the fuselage nose for mounting a forward-looking infrared unit.

The Harrier-GR.5 fighter is equipped with two underfuselage 25-mm Aden gun mounts (unit of fire up to 200 rounds). There are nine stations for accommodating other weapons: four beneath each wing panel and one beneath the fuselage between the gun mounts. Launchers for the AIM-9L Sidewinder air-to- air short-range guided missile are mounted on two underwing stations located in front of the underwing landing gear struts. Bombs for various purposes, free-flight aircraft rocket launchers, and fuel tanks can be suspended on the other stations.

The Royal Air Force command plans to rearm three combat squadrons and one combat training squadron with Harrier-GR.5 aircraft by 1990. In the opinion of British military specialists, the new V/STOL fighters with modern armament are a very effective means of providing close air support to ground forces.

Aircraft Radio Communication Equipment

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[Article by Col D. Figurovskiy, candidate of technical sciences]

[Text] At the present time essentially the only capability for controlling air force personnel and equipment in the air is to use different kinds of radio communication. Depending on the tasks to be accomplished, radio communication equipment can be divided into special purpose (for transmitting strategic information, telemetry, sonobuoy data and so on) and general purpose, used for direct air traffic control and control of aircraft combat operations.

The foreign press notes that achievements of S&T progress are introduced most promptly to more sophisticated and costly special equipment; even now space technology is being used widely in such equipment; laser communications is being developed; and the Tacamo very low frequency communication equipment is being

constantly perfected. In addition to this, there was also a sharp increase in demands on combat capabilities of general purpose aircraft radio communication equipment. This is explained in particular by the fact that the bulk of the 100 types of radios used to outfit aircraft and helicopters of air forces of capitalist countries are considerably outdated and do not have sufficient capabilities, especially in concealment, jam resistance, response speed, and in supporting a digital exchange of data.

It is planned to reach a solution to these problems both by the expanded use of S&T achievements and in designing by taking account of requirements for optimizing the specifications and performance characteristics of equipment depending on the combat missions accomplished with its help. The following are the basic general directions for improving communication equipment, including on-board aircraft gear:

—Transition from analog to digital signal transmissions;

—Automation of control over communication nets;

—Establishment of nets with reserve communication channels for improving survivability under conditions of fire pressure;

—Use of means and methods of rotary switching of signals and messages;

—Application of data multiplexing using time multiplexing of communication channels;

—Use of spread spectrum signals, including with step frequency tuning, which should sharply improve jam resistance;

—Creation of narrowly directional antennas with radiation patterns controllable for direction and shape for use in communication equipment intended for line of sight operations and highly protected against communications intelligence and communications jamming.

Such achievements of S&T progress as the appearance of satellite radio communications, an expansion of frequency bands in use right up to the millimeter band, use of computers for automated control and optimum signal processing, and mastery of an advanced radio component base (integrated circuits, functional-electronics devices, microminiaturization and so on) as well as of other results of research of recent decades permitted developed capitalist countries to begin creating fundamentally new communication and control systems and equipment from the late 1970's. Their introduction in the armed forces began above all in the air force and naval aviation.

The development of aircraft radio communication equipment was seen especially intensively beginning in 1978 with the emergence of microprocessor technology from the laboratories into mass production. The principal advantages of these new systems and equipment compared with those in the inventory are the possibility of creating communication nets with an essentially unlimited effective range and serving a large number of users (up to several thousand); high protection against radio intercept and electronic countermeasures; and reliable scrambling of transmitted messages. Meanwhile, considering the high cost of developing, producing and operating the advanced radio communication systems and equipment, military specialists of leading capitalist countries give fixed attention in creating them to questions of combat purpose so as to avoid excessive complication of the equipment if possible. It is believed that radiotelephone will continue to be used chiefly for transmitting urgent information (combat situation, target designation, air traffic control and so on) in the next decade, and data in digital form should be used for getting out nonperishable messages such as the distribution of personnel and equipment, general information on the enemy, assignment of combat missions to large and small units, and others. Foreign developers also are taking just as differentiated an approach to requirements for the degree of protection of communications against enemy reconnaissance and jamming, which should conform to the importance of missions and the level of control.

These considerations were displayed especially clearly in developing the American JTIDS joint tactical information distribution system. E-3 early warning and control aircraft and a number of NATO air defense ground assets interworking with them in Europe already have been outfitted with this system's equipment. Because of the fact that air defense is on alert duty even in peacetime, the JTIDS system supported this interworking because of the capability of transmitting a large volume of data in digital form. On the other hand, inasmuch as it is planned to use this system in the future for accomplishing a very broad range of tactical missions, this explains the great diversity of equipment being developed for it, differing in design and degree of protection against electronic countermeasures.

Radios of the American-developed Have Quick and Cingars or the British Jaguar systems can be given as another example of optimizing the characteristics of radio communication equipment in the interests of most rapid use of S&T achievements in it. These radios protect communications against enemy reconnaissance by using a mode of slow frequency hopping by pseudorandom law, one of the methods of receiving spread-spectrum signals.

Have Quick system radios in the 225-400 MHz band already have been created at the present time. Equipping U.S. Air Force tactical aircraft with them is nearing completion. Series production of Cingars system radios in the 30-88 MHz band also has begun. For example, the firm of Cincinnati Electronics is developing on-board equipment of this series intended for organizing jam- protected communications over the ground-to-air channel used in supporting the coordination of army aviation with ground forces. Development of the Cingars system consists of upgrading radio equipment with slow frequency hopping devices. It is believed that this engineering solution will ensure simplicity

in replacing equipment under field conditions and will require minimum changes in aircraft cockpit design.

Basic specifications and performance characteristics of aircraft radios are given in the table.

Basic Specifications and Performance Characteristics of Aircraft Radios

Designation, Developing Country	Purpose	Where Installed	Frequency Band, MHz	Output, watts	Additional Data
1	2	3	4	5	6
AN/ARC-33, USA	ultra-shortwave line of sight communications	B-52	225- 399.9	.	20 preset frequencies (total of 1,750 channels every 100 kHz). Guard channel in 238-248 MHz band
AN/ARC-34, USA	ultra-shortwave communications	B-52, C-135, KC-135, T-38, HH- 43	225-399.9	.	Series of radios similar to AN/ARC-33. AN/ARC-34C has 3,500 channels every 50 kHz. Automatic tuning to guard frequencies. AN/ARC- 34CX has 10 watts of power
AN/ARC-36B, USA	ultra-shortwave communications	C-135, KC-135	100- 156	8	16 preset frequencies in two bands, quartz stabilization
AN/ARC-44, USA	ultra-short-wave communications over air-to-air and air-to-ground channels	U.S. Air Force and Royal Air Force aircraft	24-51.9	.	FM. Can be used for navigation. Has 280 channels every 1 kHz. Compatible with scrambler equipment
AN/ARC-45, USA	ultra-short-wave communications over air-to-air and air-to-ground channels	U.S. Air Force aircraft and helicopters	.	.	Modulation by 400 Hz frequency provided for performing navigation tasks
AN/ARC-49, USA	ultra-short-wave communications	B-52, C-130	100-156	8	48 preset frequencies (2 bands of 8 channels each)
AN/ARC-51, USA	ultra-shortwave communications over air-to-air and air-to-ground channels	U.S. and Israeli air force aircraft			Can be used for navigation
AN/ARC-51BX, USA	ultra-shortwave communications over air-to-air, air-to-ground and air-to-ship channels	Aircraft and helicopters	225- 399.9	28	3,500 channels, AM. Can be used for radio direction finding [RDF]
AN/ARC-51X, USA	ultra-shortwave communications over air-to-air, air-to- ground and air-to-ship channels	Aircraft and helicopters	225- 399.9		1,750 channels, AM. Can be used for RDF
AN/ARC-54, USA	ultra-short-wave communications over air-to-air and air-to-ground channels	Aircraft and helicopters	30-69.95	10	Can be used as relay and for RDF. Compatible with scrambler equipment. 800 channels every 50 kHz, FM, range up to 125 km
AN/ARC-55, USA	ultra-shortwave communications over air-to-air and air-to-ground channels	Aircraft and helicopters	225-399.9	.	1,750 channels. Has guard channel in 238-248 MHz band. Automatic power reduction at altitudes over 4,500 m. Replaces AN/ARC-51X radios.

Basic Specifications and Performance Characteristics of Aircraft Radios

Designation, Developing Country	Purpose	Where Installed	Frequency Band, MHz	Output, watts	Additional Data
1	2	3	4	5	6
AN/ARC-58, USA	Long-range short-wave communications	B-52, C-135, KC-135, E- 4A	2-30	547	2,800 channels every 1 kHz. AM on single or double side band, automatic antenna tuning. Remote control
AN/ARC-60A, USA	ultra-short-wave communications over ground-to-air and air-to-air channels	Aircraft and helicopters	228-258	2	Range up to 100 km at flight altitude of 1,500 m. Replaces AN/ARC-45 in U.S. Army aviation
AN/ARC-63, USA	Emergency ultra-short-wave communications over air-to-air and air-to-ground channels	Aircraft	238-248	.	Used as reserve equipment. Two channels: one every 0.1 MHz, selected within entire band, second separated by plus or minus 0.5 MHz from the first
AN/ARC-65, USA	Long-range short-wave communications	B-52, C-130, C-135, KC- 135	2-23.999	.	Automatic antenna tuning, remote control. 20 preset frequencies every 1 kHz
AN/ARC-66, USA	Short-range ultra-short-wave communications	F-104, C-135, KC-135	225-399.9	.	1,750 channels, of which 20 are preset. Has guard channel
AN/ARC-70A, USA	Short-range ultra-short-wave communications	.	225- 399.9	20	1,750 channels, of which 20 are preset. Has guard channel
AN/ARC-73, USA	VHF communications over air-to-air and air-to-ground channels	Aircraft and helicopters	116-149.95	20	680 channels (there is a 720 channel version in the 116-151.95 MHz band)
AN/ARC-89(V), USA	ultra-shortwave communications	E-4	.	.	Number of channels variable
AN/ARC-90, USA	ultra-shortwave communications	C-141	225- 399.9	.	Provides direct and inverse signal conversion from 60 MHz frequency to ultra-shortwave band and power increase. Has guard channel in 238-248 MHz band
AN/ARC-92, USA	ultra-shortwave communications	Aircraft	2-29.999	400	Mean power with AM 100 watts. SSB communication, 28,000 channels
AN/ARC-98, USA	short-wave communications (over-the-horizon)	Aircraft	2- 30	.	100 Hz channel spacing. Transmission of clear and scrambled voice and data. Can be used as relay
AN/ARC-102, USA	short-wave communications over air-to-air and air-to-ground channels	Army aviation aircraft	2-29.999	400	Range 650 km. 28,000 channels every 1 kHz
AN/ARC-108, USA	ultra-short-wave communications	CH-3	242-244	5	Used when standard radios fail
AN/ARC-109, USA	Short-range ultra-short-wave communications	Aircraft	225- 400	3	AM SSB. 3,500 channels every 50 kHz, of which 20 are preset

Basic Specifications and Performance Characteristics of Aircraft Radios

Designation, Developing Country	Purpose	Where Installed	Frequency Band, MHz	Output, watts	Additional Data
1	2	3	4	5	6
AN/ARC-114, USA	Multichannel shortwave communications	Aircraft	30- 79.95	10	920 channels every 50 kHz. Bandwidth 300-6,000 Hz ??
AN/ARC-114A, USA	shortwave communications	Army aviation aircraft and helicopters	30-75.95	10	Compatible with AN/VRC-12, AN/PRC-77 and AN/PRC-25 ground radios and with modern scrambler equipment. Transmission of digital data possible. 920 channels, guard channel in 40-41 MHz band, FM. Weight under 3 kg
AN/ARC-115, USA	shortwave communications over air-to-air and air-to-ground channels	Army aviation aircraft and helicopters	116-149.975	10	AM. Can be used for relay and radio navigation. 1,360 channels, guard channel in 119-124 MHz band
AN/ARC-115A, USA	shortwave communications	Aircraft and helicopters	116- 149.975	.	Made fully with solid-state devices. 1,360 channels. AM. 3,500 channels and guard channel in 238-248 MHz band. Can be used for relay and RDF
AN/ARC-123, USA	Long-range HF communications over air-to-air and air- to-ground channels	F-111, FB-111	2-29.999	400	AM on SSB and phase-shift keying [PSK]. Output 125 watts on AM, 200 watts with PSK. 100 Hz channel spacing
AN/ARC-131, USA	shortwave communications over air-to-air and air-to-ground channels	Aircraft and helicopters	30-75.95	10	Can be used for relay and RDF. Compatible with scrambler equipment. Has 920 channels
AN/ARC-133, USA	Short-range ultra-shortwave communications	Aircraft and helicopters	225-399	10	1,750 channels every 100 kHz, of which 20 are preset. Has capability of scrambling traffic
AN/ARC-134B, USA	shortwave communications over air-to-air and air-to-ground channels	Army aviation aircraft	116-149.975	25-40	680 channels every 50 kHz. Has version with 1,360 channels every 25 kHz. Used in air traffic control system. Compatible with modern scrambler equipment
AN/ARC-143B, USA	Satellite ultra-shortwave communications	P-3	225- 399.975	100	Communications via satellite or within line of sight. Primary purpose is to transmit data with code modulation. AM possible with 30 watt power output
AN/ARC-146, USA	Satellite ultra-shortwave communications	Aircraft	240- 315	.	Transmission of data, voice and teletype traffic. Communications via satellite

Basic Specifications and Performance Characteristics of Aircraft Radios

Designation, Developing Country	Purpose	Where Installed	Frequency Band, MHz	Output, watts	Additional Data
1	2	3	4	5	6
AN/ARC-159, USA	ultra-shortwave communications	F-14, A-6, A-7	225- 399.975	.	Standard U.S. Naval Aviation aircraft radio. Can be used for RDF. 700 channels every 25 kHz, guard channel on 243 MHz
AN/ARC-161, USA	Long-range HF communications	P-3	2- 29.999	.	Range 480 km. Supports message encryption (data, voice, teletype). 280,000 channels every 100 Hz. Compatible with NTDS
AN/ARC-164, USA	ultra-shortwave communications	U.S. Air Force and Royal Air Force aircraft	225-399.975	30	Based on modern technology. Mean time between failure over 1,000 hours. 7,000 channels every 25 kHz, of which 20 are preset; guard channel in 243 MHz band
AN/ARC-164(V)12, USA	ultra-shortwave communications	U.S. Air Force aircraft	225-399.975	100	Transmission rate up to 45 kilobits per second. AM, FM and pulse position coding. 7,000 channels every 25 kHz, guard channel in 238-248 MHz band. FM bandwidth 8 kHz, with pulse position coding 20 kHz. Intermediate frequency 70 MHz. Has jam protection devices.
AN/ARC-165, USA	Long-range HF communications over air-to-air and air- to-ground channels	E-3	2-29	1,000	Data and voice transmission in scrambler mode in AWACS system. AM SSB. 28,000 channels every 100 Hz. Bandwidth 300-3,000 Hz
AN/ARC-166, USA	shortwave communications	E-3	116-151.975	25	Clear voice message transmission in AWACS system. AM. Channel spacing 25 kHz. Bandwidth 300-3,000 Hz
AN/ARC-170, USA	HF communications	Aircraft	2- 29.999	1,000	Improved version of AN/ARC-142 and -161 radios. Compatible with Link 11 data transmission system. Message scrambling, 280,000 channels every 100 Hz
AN/ARC-181, USA	shortwave communications in JTIDS system	E-3	960- 1,215		Transmission of scrambled data in rotary switching mode. Jam protection. Line of sight communications. Bandwidth 10 MHz at 969 MHz frequency

Basic Specifications and Performance Characteristics of Aircraft Radios

Designation, Developing Country	Purpose	Where Installed	Frequency Band, MHz	Output, watts	Additional Data
1	2	3	4	5	6
AN/ARC-168(V), USA	shortwave communications	F-5, F-15, F-16, C-130, EC- 135, A-10, AH-1, AH-64	30-88.975; 108-159.975	10	2,320 channels in FM mode and 1,760 in AM mode every 25 kHz. Compatible with modern scrambler equipment. Voice and data transmission. 20 preset frequencies, guard channels on frequencies 121.5 MHz (AM) and 40.5 MHz (FM). Broadband and narrowband intermediate frequencies
AN/ARC-187, USA	Satellite ultra-shortwave communications	Aircraft	225- 400	100	Uses modern technology (solid-state devices, digital equipment, three-loop frequency synthesizer). Scrambled data and voice transmission in AM and FM modes. 7,000 channels every 25 kHz, guard channel on 248 MHz and 20 preset channels. Used in Link 4 and Link 11 data transmission systems
AN/ARC-195, USA	shortwave communications	Aircraft and helicopters	100- 159.975	10	Advanced version of AN/ARC-164. Modular design. 2,400 channels every 25 kHz. Channel switching time no more than 0.25 sec. Mean time between failures 1,000 hours.
AN/ASC-14, USA	Satellite SHF communications	JCS airborne command post	7,000-8,000	.	Voice, telegraph and data transmission in digital form in DSCS communication system
AD-1200, UK	shortwave communications in air traffic control system	Royal Air Force aircraft	118-135.975	10-20	720 channels every 20 kHz. Preset power output. Voice traffic. AM
AD-3400, UK	ultra-shortwave communications	Royal Air Force and Brazilian Air Force aircraft	30-400	.	Multimode. Line of sight communications, covers entire shortwave band. Has AM and FM
ARC-340, UK	Same as above	Helicopters	.	.	
ERA-9000, France	ultra-shortwave communications	French Air Force aircraft	30-400	.	The frequency band expands to 410 MHz for inclusion in satellite communication system. Modular design
HF-121, USA	HF communications	.	2-29.999	100; 500; 1,000	For transmitting tactical voice messages and digital data. 280,000 channels. Sideband transmission and reception

Basic Specifications and Performance Characteristics of Aircraft Radios

Designation, Developing Country	Purpose	Where Installed	Frequency Band, MHz	Output, watts	Additional Data
1	2	3	4	5	6
OTB 420, France	shortwave communications	French Air Force aircraft	.	5	8,040 channels
TR-AP-138, France	shortwave communications over air-to-air and air-to-ground channels	French Air Force aircraft	100-156	20	Fixed frequency spacing 25 and 50 kHz. Built-in serviceability test
TRU950, France	ultra-shortwave communications	Aircraft	225- 399.975	20	Developed for export. 7,000 channels every 25 kHz
718U-5, USA	HF communications	Light aircraft and helicopters	2- 29.999	100	Fully solid-state. 280,000 channels every 100 Hz. Scrambled voice and telegraph communications on SSB. High equipment reliability
718U-5M, USA	HF communications	Light aircraft and helicopters	2- 29.999	.	380,000 channels. SSB communications
728U, USA	HF communications	B-52, KC-135	2- 29.999	400	280,000 channels, of which 20 are preset. Replacing outdated equipment
4600-E, France	shortwave communications over air-to-air and air-to-ground channels	Aircraft	118-143.975	20	From 360 to 1,040 channels every 25 or 50 kHz. Built-in functional test
Saram 7-82, France	ultra-shortwave communications	Aircraft	225- 400	.	7,000 channels. Guard channel in 238-248 MHz band. Has digital frequency synthesizer
ERA 7000, France	ultra-shortwave communications over air-to-air and air-to-ground channels	Aircraft	118-143.975; 225-399.975	5	8,040 channels, of which 20 preset. Guard channel in 228-248 MHz band. Power is 25 watts with supplementary amplifier
ERA 9000, France	ultra-shortwave communications	Aircraft	26- 400	25	Modular design supports multimode capability. Built-in microprocessor for automatic equipment tuning and test. Solid-state devices. AM and FM. Channel spacing 25 or 50 kHz. 20 preset channels. Guard channel in 238-248 MHz band
XT 3000, FRG	ultra-shortwave communications over air-to-air and air-to-ground channels	Aircraft	100-162; 225-400	.	Channel spacing 25, 50 and 100 kHz. 28 preset channels. Built-in equipment serviceability test
XK 401, FRG	Long-range HF communications over air-to-air and air-to- ground channels	Tornado	2-29.999	400	280,000 channels every 100 Hz. Modular design with solid-state devices. Two intermediate frequencies (30 kHz and 72.03 MHz). Has scrambler devices, jam protection, automated testing and tuning

Basic Specifications and Performance Characteristics of Aircraft Radios

Designation, Developing Country	Purpose	Where Installed	Frequency Band, MHz	Output, watts	Additional Data
1	2	3	4	5	6
610, FRG	shortwave communications	Aircraft	100-155.975; 225- 299.975	105	Series of radios for communication by radiotelephone and data transmission at a rate up to 16 kilobits per sec. Channel spacing 25 or 50 kHz. Up to 30 preset channels. Guard channels in 121.5 and 242 MHz bands
ARC-340, UK	shortwave communications over air-to-air channels	Royal Air Force aircraft	30-75.975	20	Channel spacing 25 and 50 kHz. Output can be reduced to 1 watt. Built-in test
PTR 1751, UK	ultra-shortwave communications	Royal Air Force aircraft and helicopters	225-399.975	20	7,000 channels every 25 or 50 kHz, 17 preset. Guard channel in 243 MHz band. Mean time between failures 800 hours
PTR 1741, UK	shortwave communications	Royal Air Force aircraft	100- 155.975	10	Simplified version of PTR 1751 radio. 2,240 channels every 25 or 50 kHz
PTR 1721, UK	ultra-shortwave communications	Royal Air Force and Italian Air Force aircraft	100-156; 225-400	.	9,240 channels every 25 or 50 kHz, 17 preset channels. Guard channels in 121.5 and 243 MHz bands. Solid-state devices. Has digital frequency synthesizer. Operating temperature range from - 40 to +70°C, altitude up to 33,000 m
SAM 100, USA	HF communications	Norwegian and Republic of South Africa air force aircraft	2-14	100	Half-duplex SSB communications. Frequency stability plus or minus 20 Hz in the temperature range from -30 to +60°C. 10 fixed frequencies
SAM70, USA	HF communications	Aircraft	2-14	40	Five channels, SSB communications
628 T-1, USA	Long-range HF communications	Transport aviation aircraft	2.8-26.999	200	24,200 channels every 1 kHz. Modular design, digital frequency synthesizer. SSB communications. Built-in test. Version 628T-2 has 2-30 MHz frequency band and 280,000 channels
HF-200, USA	HF communications	Light aircraft	2- 22.999	100	Channel spacing 100 Hz. 20 preset channels. Half-duplex upper side band communications

Basic Specifications and Performance Characteristics of Aircraft Radios

Designation, Developing Country	Purpose	Where Installed	Frequency Band, MHz	Output, watts	Additional Data
1	2	3	4	5	6
HF-220, USA	Long-range HF communications	Aircraft and helicopters	2-22.999	100	210,000 channels every 100 Hz, up to 16 preset channels
shortwave-250, USA	shortwave communications	Aircraft	118-135.975	10	720 channels every 25 kHz
618, USA	shortwave communications	Aircraft	118-135.975; 116- 151.975	25	Series of radios. 1,440 channels every 25 kHz. Mean time between failures 4,000 hours
618T, USA	Long-range HF communications	Aircraft	2- 29.999	400	28,000 channels every 1 kHz
WT-200, USA	shortwave communications	Aircraft and helicopters	118- 135.975	20	720 channels every 25 kHz. Modular solid-state design, digital frequency synthesizer

General purpose radios in the inventory operate in the following standard frequency bands: 2-89 MHz (covering HF and the low-frequency part of VHF), 100-174 MHz (metric wave portion) and 225-400 MHz (decimeter portion of ultra-shortwave). The 960-1215 MHz frequency band began to be developed in recent years in connection with adoption of the JTIDS system. Satellite equipment of the 225-400 MHz band is used at the U.S. strategic level; communication equipment of JCS airborne command posts uses the 7000-8000 MHz SHF band. A number of ultra-shortwave radios operate simultaneously in the metric and decimetric areas of the band (100-174 and 225-400 MHz).

The aircraft of strategic, reconnaissance and military transport aviation are outfitted with HF radios on a mandatory basis. In this case they are used for long-range (hundreds of kilometers) and superlong-range (thousands and tens of thousands of kilometers) communications. The output of airborne command post radio transmitters reaches 1000 watts and their receivers provide for coming up in communications on hundreds of thousands of channels with a frequency spacing of 100 Hz in the majority of cases. The instant selection of preset channels is accomplished by selecting any of 280,000 channels; these radios are not preset.

Ultra-shortwave radios are installed in all aircraft and helicopters. The communication range they provide depends chiefly on the flying craft's altitude and so does not exceed 500 km. The output is 2-100 watts and the number of channels consists of several thousand with a channel spacing of 25 or 50 kHz. Up to 20 channels are preset.

Microprocessors with integrated circuits are widely used in the designs of the most modern radios to automate their operation. For example, there are four such circuits in the AN/ARC-199 HF radio of the American firm of King. They provide for automatic activation of decoding devices when receiving signals with a certain code sequence; they operate in a frequency hopping mode over 20 channels; they switch the transmitter to one of three possible output levels that is not excessive but is sufficient for organizing reliable communications, thus considerably hampering enemy reconnaissance of the radio (the so-called low intercept probability mode); and they automatically activate jam protection devices, output instructions to the operator on optimum control of the equipment, and automatically test its serviceability. The use of microminiature components in this radio's design permitted the developers to reduce its weight to 10 kg.

According to foreign press reports, the AN/ARC-200 radio developed on the very same principles is being installed in U.S. Navy F/A-18 aircraft. It can be used to transmit not only voice messages, but also data in digital form, i.e., it can be included in the makeup of automated control systems based on computers.

The AN/ARC-186, the new American standard radio for all types of military aircraft, is a typical modern set for the VHF band. U.S. Air Force F-15, F- 16, A-10 and C-130 aircraft already are being outfitted with this radio. It can be used to communicate over 4,080 channels which have a spacing of 25 kHz. The set operates in FM (in the 30-88 MHz band) and AM (108-152 MHz) modes. Scrambled traffic can be received and transmitted and data exchanged in digital form at a rate of 18 kilobits per second in both modes.

Small volume (around 5 dm^3) and light weight (on the order of 3 kg) permit installing the radio directly on the instrument panel as well as upgrading its equipment without substantial alterations to the aircraft itself. In the future it is planned to use a frequency hopping mode in the set, provide a capability of conducting intercom telephony and data transmission in a high-speed mode, as well as increase power output and consequently the range and reliability of communications.

In the opinion of foreign military specialists, those technical capabilities being discovered in connection with industrial development of the technology of designing and mass producing very large scale, superhigh speed, and high frequency integrated circuits should influence the long-range plans (after the year 2000) of the United States and other NATO countries especially strongly. These achievements will place on the agenda the creation of integrated systems performing such basic functions of air force command and control as communications, navigation and identification simultaneously and together. It is presumed that such systems will operate in a very wide range of frequencies (from 2 MHz to 2 GHz) and be highly adaptive to a rapidly changing electronic situation.

Ocean and Sea Lines of Communication in U.S. and NATO Plans

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[Part 1 of article by Vice Adm (Ret) I. Khurs]

[Text] The U.S. and NATO military-political leadership repeatedly has emphasized that success in conducting lengthy combat operations in Europe depends largely on the stability and uninterrupted functioning of bloc ocean and sea lines of communication [LOC], above all in the Atlantic. This is not by chance. The primary sectors of industry of North Atlantic Alliance European countries are so dependent on the import of raw materials that, in the assessment of foreign specialists, their normal activity cannot last more than three months after the beginning of a coalition war without replenishment of stocks.

The state of the economy of Western European states and the United States, and the state of their military industry above all, depends to a considerable extent on the import of strategic materials such as niobium, sheet mica, strontium, bauxite, aluminum oxide, cobalt and tantalum. Petroleum, most of which is transported from afar, is another group of strategic materials dictating the direction and intensity of maritime shipping. For example, less than one-third of the necessary quantity of petroleum is produced in the United States and Western European countries. Meanwhile, consumption of petroleum by this group of countries and by Japan comprises three-fourths of consumption by the entire capitalist world.

The growth of world shipping is accompanied by an increase in vessel traffic density in ocean and sea theaters, especially at nodal points of shipping—in canals and on approaches to large ports (see table).

Number of Vessels Simultaneously in Passage

Seas or Areas	Number of Vessels
Atlantic Ocean	3000-4000
Mediterranean	2500
Baltic Sea	Up to 800
Philippine Sea	Up to 450
South Korean Sea [sic]	Over 700
Strait of Malacca-Japan	Over 600
Australia-Japan	About 200
English Channel-Cape of Good Hope	Over 400

With the onset of military operations the directions and nature of shipping in support of armed forces groupings will depend on the scale of warfare. During World War II 6-7 million servicemen and 250 million tons of various cargoes, including around 90 million tons of petroleum products and 50 million tons of food, were transported by sea to Europe alone. Sea LOC also were used intensively in local military conflicts. During three years of the aggression in Korea maritime transport moved 73 million tons of cargo. In the first seven years of the war in Vietnam over 100 million tons, or 97.5 percent of all cargoes, were transported by sea from the United States.

Should a modern coalition war be unleashed the significance of ocean and sea shipping in directly supporting the armed forces and the economy will increase for a number of reasons and its volume will grow considerably in comparison with past wars. The following indicators are mentioned in particular: to reinforce the NATO Allied Armed Forces in Europe from the North American continent it is necessary to move over one million persons; around ten million tons of weapons, military equipment, and supplies; as well as 15-17 million tons of fuel and lubricants (some 100 vessels should arrive in European ports daily).

It is expected that over 10,000 modern vessels will be required to support shipping in the interests of the armed forces, populace and military industry of the coalition of western states; around 3,000 of these vessels will be in passage simultaneously. The vital importance of ocean and sea LOC for the NATO bloc will generate fierce naval warfare their disruption and protection, as was the case in the period of past world wars.

With the beginning of World War II the battle on ocean LOC between Germany and Great Britain assumed an intense nature. Back before the attack on Poland the Germans sent around half of the combat-ready submarines to the British Isles and secretly took the pocket battleships "Deutschland" and "Admiral Graf Spee" into the Atlantic; beginning in late March 1940 the first auxiliary cruiser- raiders refitted from cargo vessels began to operate at sea.

Operations by German surface combatants on enemy LOC were relatively successful only until 1942. During this period the raiders destroyed or captured vessels with an overall tonnage of some 904,000 gross register tons [GRT]. As opposition by the Royal Navy intensified, however, their activity gradually narrowed and finally essentially stopped for combatant ships in 1940 (after loss of the battleship "Bismarck" on 27 May) and for auxiliary cruiser- raiders in 1943.

Submarines were the principal force of the German Navy operating on U.S. and UK sea LOC in World War II. They succeeded in sinking 2,828 vessels of around 14.7 million GRT, while submarines of the warring capitalist states destroyed vessels of more than 22 million GRT overall, over 65 percent of overall tonnage losses. In this connection the reliability of the LOC defense system was determined above all by successes in warfare against submarines. The LOC defense system in the Atlantic and in European waters was developed gradually and was accompanied above all by a mobilization of the industry of westernallied countries in the anti-Hitler coalition to create antisubmarine forces and equipment, and by a search for new and effective ways of combating submarines with respect to the situation taking shape in the maritime theaters. The British alone had to involve an overall total of 1,500 land- based aircraft, 20 aircraft carriers (of which 13 were American) and around 3,500 patrol ships in support of merchant shipping. The number of American ships accomplishing antisubmarine warfare missions rose from 280 in June 1941 to 1,254 in mid-1943. During the war years British and Canadian land-based aviation flew around 44,000 sorties for screening convoys and over 76,000 for patrolling to hunt submarines. The allied buildup of antisubmarine forces and equipment and use of more modern tactics of warfare led to a consistent and appreciable drop in the success of German submarine operations. During the antisubmarine warfare a preponderance in favor of the British and Americans was clearly revealed in late 1942 and early 1943, the result being an appreciable drop in losses of vessels and transports against the background of a sharp increase in German submarine losses.

The overall tonnage of vessels sunk by aviation of all warring capitalist states in World War II was around six million GRT, or almost 20 percent of the merchant tonnage sunk. Aviation operated successfully in laying minefields, on which a considerable number of vessels were lost during the war (1.96 million GRT, or 6.3 percent of total losses).

In the opinion of western specialists, the experience of combat operations on ocean and sea LOC during World War II confirmed the special role of intelligence, which was performing two basic functions—detecting the undersea and surface enemy and guiding attack forces to him, and supporting the normal functioning of ocean and sea LOC.

In developing and improving forms and methods of warfare on LOC, the opposing sides concluded that along with communications intelligence the aircraft was one of the principal means of reconnaissance support to combat operations. The requirement for simultaneous use of several kinds of reconnaissance for accomplishing one and the same mission also was determined. Such a need arose in practice in particular while supporting the lengthy tracking of convoys and submarines, and in some cases also of surface combatants, with the enemy "handed off" from one kind of reconnaissance to another and data on him passed not only to shore command posts, but also directly to the striking forces.

Contemporary views in the United States and NATO on warfare on ocean and sea LOC are based on World War II experience with consideration of changes occurring in the development of forces and assets of warfare in the postwar period. NATO military specialists believe that in case of war the principal threat to their LOC will be represented by the modern submarines and aviation of the USSR and other Warsaw Pact countries, and that operations of surface combatants to disrupt them also are not precluded. In their assessment, intertheater maritime shipping of socialist countries will be of a limited nature. Based on this, the principal direction of theoretical studies and operational training of NATO country navies is the defense of friendly LOC against the submarine and air threat. This mission has been elevated to the rank of most important for the navy. The U.S. Navy command believes that the Navy's capability to defend ocean and sea LOC and support the movement of forces "continues to play a determining role for security of the West."

In forming contemporary views on defense of ocean and sea LOC, western military specialists encountered a number of problems, including what is in their opinion an insufficient number of ships and aircraft. For example, European NATO countries can assign some 300 surface combatants for screening convoys. As already stated, an enormous number of ships and aircraft were used to defend LOC in World War II.

The basis of western studies on questions of defense of shipping is the thesis adopted by the American administration that a future war probably will be protracted. Hence foreign specialists conclude that the longer the war lasts, the greater the significance of continuous deliveries of military cargoes to Europe (above all from the United States) over Atlantic LOC. Consequently, more forces will be required for defense of the LOC and the merchant vessels themselves. In addition, as in past

world wars, the question arises about replacing losses right in the course of combat operations. Under conditions of modern warfare, however, it will be impossible to build such numbers of combatant ships and vessels as in World War II for economic reasons and because of enemy action against shipyards. It is also believed that present U.S. naval forces and those expected in the near future are incapable of assigning sufficient escort forces for supporting a "classic convoy service." Now they no longer have the ships created under mobilization deployment during the past world war, just as there no longer are merchant vessels of that time.

All this plays a determining role in shaping modern views on defense of LOC. In elaborating the theory and working out the defense of ocean and sea LOC in practice, primary attention is being given to creating highly effective forces and assets, increasing the reliability of convoying vessels, and strengthening the role of active combat operations.

Relying on achievements of modern science and technology, the U.S. and NATO military leadership considers the creation of highly effective forces and assets one of the most important measures which will compensate for a shortage of ships and aircraft to defend shipping.

In recent years a stable trend has been seen toward a reduced noise level of nuclear-powered submarines (SSN's, Fig. 1 [figure not reproduced]). The opinion is even expressed that existing passive sonar equipment will not be able to detect and track SSN's effectively enough. Therefore great emphasis is being placed on its further development and improvement.

The SOSUS fixed long-range sonar surveillance system began to be operated in the 1950's. Over the last 30 years considerable additions have been made to the system, which is deployed in the Atlantic and Pacific, and its equipment has been substantially modernized to expand coverage. AN/FQQ-10(V) hydrophones space 9-28 km along a cable connected with shore stations are this system's information sources about the detection of noise-producing objects. The foreign press notes that in addition to the U.S. Atlantic and Pacific coasts, such shore stations have been set up in the Aleutian Islands, Canada, Denmark, Spain, Italy, Japan, South Korea, the Philippines, Turkey and Great Britain. Data being collected by these stations are transmitted by communication satellites to the U.S. Navy Main Computer Center, where a final analysis is made of the sonar noise spectrum received.

The U.S. Navy began the second phase of SOSUS system modernization to bringits capabilities into line with modern requirements.

Taking into account that because of geographic and technical limitations SOSUS is incapable of providing a continuous detection zone, the American military leadership is taking a number of steps of a purposeful nature aimed at eliminating gaps in the underwater sonar surveillance system.

The American RDSS Rapidly Deployable Surveillance System is in the development stage. It is to use aircraft-laid passive sonobuoys with a long service life. The system is intended for use in shallow water areas and geographic chokepoints with receipt of data supported by land-based patrol aircraft. Another mobile system is SURTASS (adopted by the U.S. Navy in 1984), which is towed by specially built "Stalwart"-Class vessels (T-AGOS, Fig. 2 [figure not reproduced]). Vessels equipped with SURTASS patrol in ocean areas outside of SOSUS coverage. Sonar noises and signals received by the long towed arrays are transmitted to shore data processing centers, from which information goes to command posts and to combatant ships and vessels at sea.

No less attention is being given to developing and improving tactical submarine detection equipment which essentially has become a means for guidance and target designation of the antisubmarine weapons of aircraft, submarines and surface combatants. New aircraft-laid sonobuoys and sonar signal processors are being created; in the assessment of foreign specialists, this will ensure rather high effectiveness of aircraft operations in combating future less noisy submarines.

An improvement in precision parameters of stationary and mobile systems as well as of aviation-laid sonobuoys and an improvement in structural processing of sonar signals permitted more reliable accomplishment of missions in the integrated SOSUS/P-3 aircraft system.

The majority of frigates and destroyers of capitalist countries are equipped with hull-mounted sonars. The most up-to-date in the U.S. Navy are the AN/SQS-53 and AN/SQS-56. A modernized and more advanced version of the AN/SQS-53 has been developed—the AN/SQS-53C, known as the basic tactical sonar of battle group escort ships. This sonar uses several computers joined in an integrated system. Modern American multirole nuclear-powered submarines are fitted with AN/BQQ-5 sonar systems.

New acoustic systems and signal processors are being created for future new- generation Mk 48 ADCAP and Mk 50 torpedoes. Work continues on creating new sonars and improving existing ones, including with long towed arrays, for surface combatants (Fig. 3 [figure not reproduced]) and submarines. Their advantage is that in contrast to hull-mounted sonars, they have greater submarine detection range and better resistance to jamming from internal noises.

Work being done in the United States to perfect sonar systems has a "strategic significance" and "marks a new approach to accomplishing antisubmarine warfare missions." It is expected that new and improved sonar systems and complexes will support effective antisubmarine warfare "with any technology of submarine construction."

Other capitalist countries also are working to develop shipboard sonars. Forexample, Great Britain has created the Type 2031Z towed sonar system intended for installation on new frigates. The Type 2046 passive sonar has been developed for submarines. Both systems use advanced computer technology. The Type DSBV 61A towed sonar has been created for French surface combatants.

The leading capitalist states attach great importance to increasing the mobilization readiness of the shipbuilding industry, to constructing vessels whose characteristics must conform to wartime demands, and to creating a contemporary ship repair facility.

The military-political leadership of the United States and other NATO countries gives serious attention to improving the production base of shipbuilding and to introducing new technologies to production processes which promote a growth in the effectiveness of building and repairing vessels.

Foreign specialists believe that the vessels most suitable for use in wartime (Fig. 4 [figure not reproduced]) have the following characteristics: maximum length of no more than 290 m, a beam of 30-32 m, a draft of 10-12 m, deadweight of 60,000-70,000 tons, up to 30-35 days endurance based on stores of fuel, water and provisions, and a speed of at least 20 knots. In their opinion, such characteristics permit vessels to sail in company as part of convoys and combatant ship supply groups.

Autonomous containerized weapon systems (Arapaho in the United States and SCADS and DEMS in Great Britain) have been developed for rapidly refitting merchant vessels as auxiliary naval ships. These systems are for providing antiaircraft and antisubmarine defense and for accomplishing a number of other missions. The average time to install such systems is 40-50 hours.

Measures are being taken to keep the shipbuilding (ship repair) industry in constant mobilization readiness. In the United States, for example, sites have been selected and projects and drawings prepared for yards to be constructed with the onset of war, and plans have been drawn up for placing mothballed enterprises in operation. Projects for refitting specific classes of merchant vessels as auxiliary naval ships have been drawn up at existing shipbuilding and ship repair enterprises. Stores of metal, individual machine units, mechanisms and certain kinds of arms have been created for this purpose.

On the whole, western specialists believe that with mobilization deployment of their shipbuilding and ship repair industry, the United States and NATO countries are capable of replacing possible losses of merchant vessels and ensuring the allocation of necessary numbers for performing maritime shipping.

The U.S. and NATO military leadership considers the interests of accomplishing missions of defending ocean and sea LOC in preparing maritime theaters for war. A special place in the infrastructure is held by a network of naval and air bases and of command and control and communication posts. Western experts assume that this network in combination with a surveillance system should ensure the NATO Allied Armed Forces of supremacy in operationally important parts of the ocean.

The United States and its NATO allies experience practically no shortage of naval bases, ports and airfields for naval aviation. In addition, the coastalzone of European countries as well as of the United States, Japan and South Korea has a considerable number of tactical airfields, some of which will be used for conducting naval combat operations, including in defense of sea LOC.

Seaports are not only loading and unloading points of the LOC and centers for restoring the technical readiness of vessels, but they are also naval basing installations. A number of steps is being taken to prepare seaports to support vessels under wartime conditions. In particular, their network is being expanded (there are over 300 ports on the European Atlantic coast in which vessels with a displacement up to 40,000 tons can be unloaded), port equipment is being improved, channels are being deepened, berthage is being increased, and complexes are being created for loading and unloading vessels over the beach without berthing.

In the assessment of the NATO leadership, the existing network of naval bases, basing points, seaports, and air bases for naval aviation and for tactical aviation used for operations at sea on the whole ensures accomplishment of the missions of defending ocean and sea LOC.

The existing joint and national communication systems in NATO countries are for the most part multiply redundant in equipment, kinds of transmission and channels, they are sufficiently well protected against jamming, and they meet the needs both of the navy and of merchant shipping.

The ground and satellite long-range radio navigation systems deployed in ocean and sea theaters meet modern requirements for supporting military and civilian shipping. Existing global systems (ground-based Omega and satellite Transit systems) permit monitoring the position of ships and vessels with an accuracy of 3,700 and 200 m respectively. The LORAN-C radio navigation system (effective range to 4,300 km) has an accuracy of 100-500 m. The NAVSTAR satellite navigation system being deployed (expected to become operational in the early 1990's) will provide an accuracy of determining an object's coordinates in the ocean to 16 m.

Creation of modern systems of weapons and of surveillance and reconnaissance equipment noticeably improves a navy's capabilities for conducting combat operations in general and for defending LOC in particular. This facilitated not only a transformation of past combat experience

(within advisable bounds) as applied to new conditions, but also the development of new forms of warfare on LOC which hold a leading place in the theory and practice of naval art of western navies.

(To be concluded)

Development of the Japanese Navy (FY 1988 Plan)

18010358k Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 11, Nov 1988 (signed to press 10 Nov 88) pp 53- 56

[Article by Capt 1st Rank Yu. Yurin]

[Text] Of the overall ¥3,700,300,000,000 of the Japanese military budget (around $26 billion), ¥940.7 billion (25.4 percent) were allocated for naval expenditures in FY 1988 (which began 1 April). This is 9.2 percent more than in the previous fiscal year.[1] Table 1 gives the distribution of the "expenditures" part of the naval budget by basic items.

Table 1 Distribution of Japanese Navy FY 1988 Budget by Items of Expenditure

Items of Expenditure	Amount, ¥billions	Actual Increase Compared with FY 1987, ¥billion (%)
Personnel pay and allowances	310.7	9.5(3.2)
Payment of subsequent expenditures under previous contracts*	489.1	49.5(11.3)
New contracts and payment of initial expenditures under them*	140.9	20.2(16.7)
Of the above:		
Shipbuilding (with modernization)	4.8	2.7 (228)
Aircraft construction	0.4	-0.02(-5.2)
Ammunition procurements	1.8	0.3(18.9)
POL procurements	18.0	2.4(15.4)
Combat and other training	7.9	1.0(14.5)
Motor transport procurements and routine servicing and maintenance	8.8	2.8(46.7)
Repair and spare parts	58.7	3.5(6.4)
Construction of facilities	20.3	6.7(49.8)
Other	20.2	0.8(4.1)
Total	940.7	79.2(9.2)

*The nature of settlements under previous and new contracts in subsequent years is examined in the text of the article.

The amount of payment of subsequent expenditures under previous contracts (¥480.1 billion), in accordance with plans for organizational development of the Japanese Navy for fiscal years 1984-1987, includes expenditures for shipbuilding (22 ships and vessels), aircraft construction (74 aircraft and helicopters), and for procurements of weapons, military equipment and property with deferred payments on those contracts. Some of the contracts also provide for further payments which will be reflected in the "expenditures" part of the Navy budget in fiscal years 1989-1990, while payments on other contracts must be completed in the current year, i.e., the Navy will receive the following naval hardware: the submarine SS 582 "Satishio"; the guided missile destroyers DD 152 "Yamagiri," DD 153 "Yugiri" and DD 154 "Amagiri"; the minesweepers MSC 668 "Yurishima" and MSC 669 "Hikoshima"; the training support ship ATS 4202 "Kurobe"; five auxiliary vessels (YT-70, YW-17, YO-25, YO-26, YG-203); ten P-3C Orion land-based patrol aircraft; a US-1A search and rescue seaplane; three KM-2K trainer aircraft; an LC-90 liaison aircraft; 13 HSS-2B antisubmarine helicopters (including six deck-based); and two OH-6D training helicopters. Fourteen ships and vessels (two Type SS 583 submarines, four "Asagiri"-Class guided missile destroyers, four DE 229-Class guided missile frigates, two "Hatsushima"-Class minesweepers, two "Towada"-Class general-purpose supply transports) as well as 44 aircraft and helicopters (19 P-3C's, 1 EP-3J, 1 U-36A, 17 HSS-2B's, 6 MH- 53E's) will remain in various stages of construction and will enter the Navy inventory over the next two fiscal years.

New contracts valued at an overall ¥664.7 billion include both initial expenditures and subsequent deferred payments (¥523.8 billion), which inevitably must be included in the "expenditures" part of the FY 1989- 1992 Navy budgets. According to specific purpose, subsequent payments are distributed as follows: shipbuilding (with modernization) ¥170.9 billion, aircraft construction ¥165.5 billion, ammunition procurements ¥38.9 billion and logistic support ¥148.5 billion.

The **shipbuilding program** for FY 1988 includes placement of new orders for building eight ships and vessels with an overall displacement of 11,910 tons (in addition to those under construction). Table 2 shows their classes and the expenditures connected with construction.

Table 2 Japanese Navy FY 1988 Shipbuilding Program

Type and Class of Ship or Vessel, Number (Serial Number in Series)	Displacement (Standard), tons	FY of Completion	Sum of Expenditures, ¥ billion		
			Initial (In FY 1988)	Subsequent	Total
New Class DDG 173 guided missile destroyer (lead)	7,200	1992	3.3	118.9	122.3
SS 583-Class submarine (3d)	2,400	1991	0.1	37.8	37.9
"Hatsushima"-Class minesweepers, 2 (24th and 25th)	490*	1990	0.02	13.2	13.2
Auxiliary vessels, 4		1989	0.1	1.0	1.1
Of the above:					
Tug (YT-71)	260	1989	.	.	.
Water carrier (YW-18)	310	1989	.	.	.
Oil barge (YO-27)	490	1989	.	.	.
Gasoline tanker (YG-204)	270	1989	.	.	
Total	11,910	1988-1992	3.6	170.9	174.5

*For each ship.

The Navy **aircraft construction program** in the current year (Table 3) provides for placing new orders for 27 aircraft and helicopters (in addition to those being built) for an overall cost of ¥ 165.9 billion.

Table 3 Japanese Navy FY 1988 Aircraft Construction Program

Type of Aircraft or Helicopter, Number (Serial Number in Series)	FY of Completion	Sum of Expenditures, ¥ billion		
		Initial (FY 1988)	Subsequent	Total
P-3C land-based patrol aircraft, 9 (70th- 78th)*	1991	0	88.3	88.3
EP-3J EW aircraft (2d)	1991	0	11.4	11.4
U-36A EW and training support aircraft (4th)	1990	0	2.8	2.8
US-1A search and rescue seaplane (12th)	1990	0	6.0	6.0
KM-2K trainer aircraft, 3 (4th-6th)	1989	0.1	0.9	1.0
SH-60J deck-based ASW helicopters, 12 (1st-12th, not counting two prototypes)	1991	0.3	56.1	56.4
Total	1989-1991	0.4	165.5	165.9

*Aircraft of Update-III modification.

It is planned to increase the authorized strength of Navy servicemen to 46,085, retaining the previous strength level (96 percent). The number of civilian employees is to be reduced to 4,085 and the permanent reserve strength level brought up to 1,100.

It is planned to **activate** the 46th Guided Missile Destroyer Division ("Yugiri" and "Amagiri") and 1st Flotilla (Yokosuka Naval Base) as new ships are commissioned, as well as the 124th Helicopter Squadron of the 21st Air Wing (Tateyama Air Base). It is planned to **disband** the 44th Separate Minesweeper Division of the Maizuru Naval Area (the ships "Tashiro" and "Miyato" will be transferred to the reserve and reclassified as auxiliaries—YAS 89 and YAS 90 respectively) and the 31st Squadron, 31st Air Wing (Iwakuni Air Base). It is also planned to **resubordinate** the 43d Guided Missile Destroyer Division ("Isoyuki" and "Haruyuki") from the 1st Flotilla to the 4th (Yokosuka Naval Base), and one minesweeper division from the Fleet to the Maizuru Naval Area commandant. In addition, it is planned tocarry out reorganizational changes in staffs of the Navy and naval areas, the 51st Separate Air Squadron and some shore subunits of the Yokosuka, Sasebo and Maizuru naval areas, and to begin reoutfitting the 5th Air Squadron, 5th Air Wing at Naha Air Base with P-3C aircraft. Obsolete ships, vessels, aircraft and helicopters will continue to be placed in reserve or written off.

Among the major **measures of operational and combat training** envisaged by the plan for organizational development of the Japanese Navy in the current year, western military specialists single out in particular the Rimpac-88 maneuvers and Exercise Kayen-63. Japan decided to send

a submarine, eight combatant ships and a general-purpose supply transport as well as eight P-3C aircraft to take part in the Rimpac multinational maneuvers for the fifth time. A feature of Kayen-63, the present final exercise of the Japanese Navy, is its full-scale character (a so-called Type A exercise under the immediate direction of the CinC Navy). Similar exercises are held no more often than once every five years, and in the past were held only twice (in 1978 and 1983). Practically all combat-ready forces of the Navy and of the five naval areas take part in them, and they include U.S. Navy ships and aircraft. Missions are practiced for deploying striking forces in areas of operational tasking and for conducting combat operations in water areas of the Western Pacific, including with the objective of blockading strait zones of the Sea of Japan.

According to the current year's plan, the most notable **work of modernizing ships** of the Japanese Navy is considered to be installation of the Vulcan-Phalanx 20-mm antiaircraft gun system on them, fitting sonars with long towed arrays on surface combatants (TACTASS sonar) and submarines (S-TASS), and adoption of FLTSATCOM satellite communication equipment. In addition, there are provisions for work to expand capabilities of the ASWOC—Antisubmarine Warfare Operations Center—at Atsugi Air Base and the SF-System automated system for tactical command and control of the fleet (Yokosuka Naval Base), to construct a VLF radio communications transmitting center near the city of Ebino (Miyazaki Prefecture, Kyushu Island), and to create the IDDN (Integrated Digital Defense Network) communication system and an integrated antisubmarine center near Yokosuka Naval Base.

Among the largest R&D projects for the Japanese Navy in the budget of the Japan Defense Agency Technical Research Center are appropriations for work on SSM-1B and ASM-1C antiship missiles, the G-RX2 and G-RX4 torpedoes, new sweeps, sonar and radar equipment, as well as other kinds of naval weapons and equipment.

On the whole, the FY 1988 plan for organizational development of the Japanese Navy reflects the priority being given to naval forces by the country's leadership. The Navy's budget appropriations are growing at faster rates than for other branches of the Armed Forces. A typical feature of the shipbuilding program is its inclusion of the latest ship (DDG 173) with the Aegis multifunction weapon system, the cost of which reached a fantastic amount for Japan—one billion U.S. dollars.[2] No less indicative is the fact that among new contracts the proportion of expenditures for logistic support is kept at the 40 percent level with its absolute growth rates at 10-11 percent a year. All this attests to stepped-up Japanese efforts to further build up its naval might.

Footnotes

1. For more detail on organizational development and budget of the Japanese Navy in 1987 see ZARUBEZHNOYE VOYENNOYE OBOZRENIYE, No 10, 1987, pp 69-71—Ed.

2. For more detail on this see ZARUBEZHNOYE VOYENNOYE OBOZRENIYE, No 1, 1988, pp 69-70—Ed.

U.S. 'Avenger'-Class Mine Countermeasures Ships

18010358l Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 11, Nov 1988 (signed to press 10 Nov 88) pp 56- 59

[Article by Capt 1st Rank Yu. Petrov]

[Text] Foreign specialists note that the U.S. Navy leadership's decision in the late 1970's to modernize minesweeping forces was the result of revised views on the threat presented by modern mines. At the present time these forces must carry out mine countermeasures support of the Navy in vast ocean areas; on approaches to naval bases, basing facilities, and ports; on sea lines of communication; and in areas of combat operations of combatant ships with the objective of neutralizing mines of any types.

Development of the project of a new mine countermeasures ship executed by the firm of Peterson Builders together with the Navy should be considered one of the important steps on the way to accomplishing those missions. This firm concluded a contract in June 1982 for building a lead mine countermeasures ship, the MCM 1 "Avenger." An order for building a second ship was awarded to the firm of Marinette Marine, which was selected as a contractor with equal status. The lead ships was commissioned in September 1987 and it is planned to commission another two ships in the Navy in 1988. It is planned to have a total of 14 in the series with completion of construction in the early 1990's. The mine countermeasures ships are to replace minesweepers built in the 1950's. All mine countermeasures ships are to be transferred to the Naval Reserve Force and manned by 60 percent Navy personnel (the remaining personnel are reservists).

Great attention in developing the project was given to consideration of alternative options of construction materials—glass-reinforced plastics, aluminum alloys, wood—and Navy specialists decided on constructing the ships of wood. They concluded that construction of a large-displacement mine countermeasures ship of glass-reinforced plastic involves considerable difficulties. Multiple-ply constructions of cedar, oak and fir boards were used in fabricating the hull of the new mine countermeasures ship. The hull planking is four-ply with a coating of several layers of glass-reinforced plastic. The two inner layers are placed diagonally crisscross out of 19-mm cedar boards glued together and joined by bolts and nails. A 76-mm layer is placed on them, which in turn is covered diagonally by a 12.7-mm layer of fir boards. The outside of the wooden planking is faced with several layers of glass-reinforced plastic impregnated by

epoxy resin. The boards, curved on templates and glued together under high pressure and appropriate heating, formthe frames (multiple-ply oak), deck beams (multiple-ply fir), keel, and stempost. The hull framing is made in a transverse arrangement with 1,067 mm between frames (Fig. 1 [figure not reproduced]). Use of computers and a three-dimensional model in designing the framing permitted increasing structural strength and reducing the weight of fastenings by 40 percent. Deck planking consists of multiple-ply glued teak plywood with an overall thickness of 50.8 mm coated by a 6.3-mm layer of glass-reinforced plastic. Resorcinol, which gave a good account of itself in building minesweepers in the 1950's, was used as the glue in fabricating the wooden constructions. In the opinion of western specialists, such technology is more labor-intensive, but it permits using wood of lesser quality and cost. In addition, the chosen construction gives the hull increased strength, impact resistance and resistance to deterioration and damage by marine microorganisms, and it facilitates hull care during operation. The superstructure is fabricated of glass-reinforced plastic. The ship practically has no steel constructions or equipment, and what there is (sweep drum, cranes, mast, engines and so on) uses aluminum alloys, copper, bronze, brass, stainless steel and other nonmagnetic alloys.

After the initial detail design of the project was developed the hull had to be lengthened by 1.8 m to increase buoyancy and metacentric stability, which had dropped because of an increase in weight of mine countermeasures equipment and as a result of shielding superstructure spaces with copper sheet to reduce the effectiveness of the electromagnetic pulse of a nuclear burst on electronics and the crew. As a result the ship had a displacement of 1,040 tons, maximum length of 68.3 m, length along the waterline of 64.9 m, beam of 11.9 m, draft of 3.5 m, and a crew of 81 including six officers.

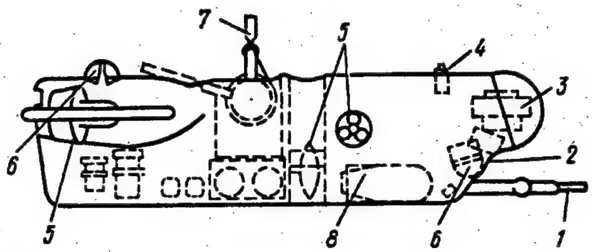
The equipment, basic electronics and other assets of the "Avenger"-Class mine countermeasures ship are consolidated in a shipboard automated combat control system, which includes three principal subsystems (variable depth sonar, mine neutralization, and precise navigation) and auxiliary subsystems. The automated combat control system uses a computer to process data from various situation coverage equipment with an indicator display in the form of alphanumeric indices and conventional symbols. It supports the continuous output of data on the search area, ship's heading and position, targets on radar and sonar displays, outlines (boundaries) of individual zones and so on.

The **AN/SQQ-30 minehunting sonar with variable depth array** is an advanced version of the AN/SQQ-14. The sonar includes two channels with arrays in a towed fairing. The search channel carries out the initial search for mines and after they are detected the high-resolution, high-frequency channel classifies the contact. The sonar is modular in execution and American specialists believe that its design fully meets the latest requirements placed on data processing and display and on radiation pattern forming. The sonar is lowered and hoisted by a winch located forward of the superstructure (Fig. 2 [figure not reproduced]). The AN/SQQ-30 sonar is to be installed in the first nine ships of the series. The subsequent five units are to be equipped with the AN/SQQ-32 sonar being developed jointly by the American firm of Raytheon and the French firm of Thomson-CSF. The former is responsible for developing the search channel using digital data processing on a computer for automatic classification of contacts and identification of minelike objects at a greater distance (than the AN/SQQ-30) under various hydroacoustic conditions, as well as developing a fairing of optimalhydrodynamic shape. Thomson-CSF will perform work to create the high- resolution high-frequency channel for target classification.

The **AN/SLQ-48 mine neutralization subsystem** includes as the primary component the EX 116 Mod 0 deep-water remotely controlled vehicle of the firm of Honeywell (Fig. 3). It is 3.8 m long, 0.9 m high, weighs 1,130 kg, and has an operating depth of over 100 m. It is equipped with two propellers activated by electric motors (15 hp each) which give a speed up to 6 knots. In contrast to the majority of similar foreign vehicles with self-contained energy sources, EX 116 mechanisms and equipment are controlled and powered over a zero buoyancy cable 1,524 m long. Vertical and horizontal thrusters are installed in the midsection of the vehicle for high maneuverability. Its equipment includes a bow-mounted high-resolution sonar, forward and aft low illumination television cameras, spotlight, two booms with a device for kinking the mine mooring, a bottom explosive charge for detonating seabed mines, and a sonar transponder beacon. The vehicle is controlled by one operator from a portable control panel by data of the shipboard sonar, the array of which is lowered to the depth where the EX 116 is located. During tests, 17-20 minutes were spent lowering and guiding the vehicle, detonating a mine and returning it to the ship. The EX 116 is stored on the starboard side of the ship and lowered to the water by two davits (the rate of hauling in cable is 215 m/min). The foreign press notes that lowering and hoisting can be done even with considerable wave action, since it is permissible to attach and detach the clamp mounted on the upper part of the vehicle even under water. The weight of the entire subsystem including control panels and cargo- handling gear is 11.8 tons. The ship can use mechanical (Oropesa), coil (M Mk 5, 6 and 7), acoustic (A Mk 4V and A Mk 6B) and combined (AN/SLQ-37(V)2) sweeps.

The **AN/SSN-2(V) precise navigation subsystem** provides for determining coordinates of the ship and mines with high accuracy. It includes a computer interfaced with a fathometer, gyrocompass (AN/WSN-2) and radio navigation system receivers (LORAN-C, Transit), as well as a sonar (AN/SQQ-30) and radar (AN/SPS-55 and -56). The subsystem processes and outputs navigation and target designation data with an accuracy to several

Fig. 3. Sketch of EX 116 Mod 0 remotely controlled submersible



Key:
1. Device for kinking mine mooring
2. Spotlight
3. Sonar
4. Sonar transponder beacon
5. Propulsion motor
6. Television cameras
7. Tow cable
8. Explosive charge

meters. It also uses data from acoustic navigation equipment. All mine contacts are numbered and their coordinates are recorded and printed out. In addition, they are visually displayed together with shiphandling data. The subsystem is supplied with visual and audio signals warning of entry into the danger zone of a recorded contact and it interfaces with equipment of the FLTSATCOM satellite communication system (OE-82 antenna, AN/SSR-1 receiver and AN/WSC-3 transceiver).

The main power plant in the first two ships is represented by four Waukesha L- 1616 650 hp nonmagnetic diesel engines operating two controllable pitch propellers and providing a maximum speed of 12 knots (14 knots for a brieftime). In addition, three 376 hp diesels of the same type serve to drive the ship's generators. Two propulsion motors (150 kw each) and a bow thruster (190 kw) are used for moving at slow speed, for maneuvering in the minehunting mode and for maintaining the ship's position. The minesweeper's maximum speed in a minehunting mode is 5 knots. Subsequent ships of the series are to be equipped with more economical IFD 36-SS6VAM 570 hp diesel engines of the Italian firm of Isotta Fraschini.

Reference Data: Cruisers of NATO Country Navies

18010358m Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 11, Nov 1988 (signed to press 10 Nov 88) pp 59- 60

[Article by Captain 1st Rank Yu. Kravchenko]

[Text] Cruisers in the order of battle of NATO country navies are represented by a relatively small group of 43 ships. Ships of this type have a rather large displacement and are armed with modern weapon systems. They are intended for accomplishing a wide spectrum of missions, the principal ones being to combat the surface, undersea and air adversary, usually as part of hunter-killer groups and escort forces for carriers, battleships, landing detachments and convoys; to deliver missile and gun strikes against the shore; and to participate in naval blockade operations.

The U.S. Navy has a considerable number of cruisers (38, of which 9 have nuclear power plants) and continues to build them. The most up-to-date are "Ticonderoga"-Class ships, the number of which are to be taken to 27.

Specifications and performance characteristics of cruisers of NATO country navies are given in the table.

Table 4

Ship Class—Number in Commission (Hull Number and Name), Year Commissioned	Displacement, tons: Standard/ Full	Principal Dimensions, m: Length; Beam; Draft	Power Plant Output, hp/ Maximum Speed, knots	Endurance, nm/ At Speed, knots	Crew (Including Officers	Armament[1]
1	2	3	4	5	6	7
UNITED STATES						
Nuclear-Powered Guided Missile Cruisers						
"Virginia"—4 (CGN 38 "Virginia," 39 "Texas," 40 "Mississippi," 41 "Arkansas"), 1976-1980	9,500/11,000	178.4; 19.2; 9	100,000/33	Unlimited	560 (40)	Tomahawk cruise missiles—2x4, Harpoon antiship missile systems—2x4, Tartar SAM systems (Standard SAM)/ASROC antisubmarine rocket system—2x2, 127-mm gun mount—2x1, 20-mm Vulcan-Phalanx AA gun system—2x6, 324-mm torpedo tubes—2x3

Table 4

Ship Class—Number in Commission (Hull Number and Name), Year Commissioned	Displacement, tons: Standard/ Full	Principal Dimensions, m: Length; Beam; Draft	Power Plant Output, hp/ Maximum Speed, knots	Endurance, nm/ At Speed, knots	Crew (Including Officers	Armament[1]
1	2	3	4	5	6	7
"California"—2 (CGN 36 "California," 37 "South Carolina"), 1974- 1975	9,560/11,000	181.7; 18.6; 9.6	100,000/33	Unlimited	550 (40)	Harpoon antiship missile system—2x4, Tartar SAM system (StandardSAM)—2x1, ASROC antisubmarine rocket system—1x8, 127-mm gun mount—2x1, 20- mm Vulcan-Phalanx—2x6, 324-mm torpedo tubes—2x3
CGN 35 "Truxtun," 1967	8,200/9,200	171.9; 17.7; 9.4	100,000/33	Unlimited	520 (39)	Harpoon antiship missile system- -2x4, Terrier SAM system (Standard SAM)/ASROC antisubmarine rocket system—1x2, 127-mm gun mount—1x1, 20-mm Vulcan-Phalanx AA gun system—2x6, 324-mm torpedo tubes—4x1, helicopter
CGN 25 "Bainbridge," 1962	7,600/8,590	172.3; 17.6; 7.7	100,000/33	Unlimited	516 (42)	Harpoon antiship missile system- -2x4, Terrier SAM system (Standard SAM)—2x2, ASROC antisubmarine rocket system—1x8, 20-mm Vulcan-Phalanx AA gun system—2x6, 324-mm torpedo tubes—2x3
CGN 9 "Long Beach," 1961	14,200/17,100	219.9; 22.3; 9.1	80,000/30	Unlimited	958 (65)	Tomahawk cruise missile—2x4, Harpoon antiship missile system—2x4, Terrier SAM System (Standard SAM)—2x2, ASROC antisubmarine rocket system—1x8, 127-mm gun mount—2x1, 20-mm Vulcan- Phalanx AA gun system—2x6, 324-mm torpedo tubes—2x3

Table 4

Ship Class—Number in Commission (Hull Number and Name), Year Commissioned	Displacement, tons: Standard/ Full	Principal Dimensions, m: Length; Beam; Draft	Power Plant Output, hp/ Maximum Speed, knots	Endurance, nm/ At Speed, knots	Crew (Including Officers	Armament[1]
1	2	3	4	5	6	7
Guided Missile Cruisers						
"Ticonderoga"—11 (CG 47 "Ticonderoga," 48 "Yorktown," 49 "Vincennes," 50 "Valley Forge," 51 "Thomas Gates," 52 "Bunker Hill," 53 "Mobile Bay," 54 "Antietam," 55 "L. Gulf," 56 "San Jacinto," 57 "Lake Champlain"), 1983-1988	./9,600	172.8; 16.8; 9.5	80,000/32	6,000/20	358 (24)	Harpoon antiship missile system—2x4, Aegis SAM system (Standard SAM)/ASROC antisubmarine rocket system—2x2 (on CG 47-51), Mk 41 VLS[2] for Standard SAM, Tomahawk cruise missile and ASROC antisubmarine rocket (122 containers, on others), 127-mm gun mount—2x1, 20-mm Vulcan-Phalanx AA gun system—2x6, 324-mm torpedo tubes—2x3, helicopters—2
"Belknap"—9 (CG 26 "Belknap," 27 "Josephus Daniels," 28 "Wainwright," 29 "Jouette," 30 "Horne," 31 "Sterett," 32 "William H. Standley," 33 "Fox," 34 "Biddle"), 1964-1967	6,570/8,200	166.7; 16.7; 8.8	85,000/32	7100/20	479 (26)	Harpoon antiship missile system—2x4, Terrier SAM system (Standard SAM)/ASROC antisubmarine rocket system—1x2, 127-mm gun mount—1x1, 20-mm Vulcan-Phalanx AA gun system—2x6, helicopter
"Leahy"—9 (CG 16 "Leahy," 17 "Harry E. Yarnell," 18 "Worden," 19 "Dale," 20 "Richmond K. Turner," 21 "Gridley," 22 "England," 23 "Halsey," 24 "Reeves"), 1962-1964	5,670/8,200	162.5; 16.6; 7.6	85,000/32	8,000/20	423 (46)	Harpoon antiship missile system—2x4, Terrier SAM system (Standard SAM)—2x2, ASROC antisubmarine rocket system—1x8, 20-mm Vulcan-Phalanx AA gun system—2x6, 324-mm torpedo tubes—2x3
FRANCE						
R 97 "Jeanne d'Arc," 1964	10,000/12,365	182; 24; 7.3	40,000/26	6,000/15	809 (30)	Exocet antiship missile system—6x1, 100-mm gun mount—4x1, helicopters—8
C 611 "Colbert," 1959	8,500/11,300	180.8; 20.2; 7.7	86,000/32	4,000/25	560 (24)	Exocet antiship missile system—4x1, Masurca SAM system—1x2, 100-mm gun mount—2x1, 57-mm gun mount—6x2

Table 4

Ship Class—Number in Commission (Hull Number and Name), Year Commissioned	Displacement, tons: Standard/ Full	Principal Dimensions, m: Length; Beam; Draft	Power Plant Output, hp/ Maximum Speed, knots	Endurance, nm/ At Speed, knots	Crew (Including Officers	Armament[1]
1	2	3	4	5	6	7
ITALY						
C 550 "Vittorio Veneto," 1969	7,500/8,850	179.6; 19.4; 6	73,000/32	6,000/20	550 (50)	Otomat antiship missile system—4x1,Terrier SAM system (Standard SAM)—1x2, 76-mm gun mount—8x1, 40-mm gun mount- -3x2, 324-mm torpedo tubes—2x3, helicopters—9
"Andrea Doria"—2 (C 553 "Andrea Doria," 554 "Caio Duilio"), 1964	6,000/6,500	149.3; 17.2; 5	60,000/31	6,000/20	470 (45)	Terrier SAM system (Standard SAM)—1x2, 76-mm gun mount—8x1 or 6x1, 324-mm torpedo tubes—2x3, helicopters—4

1. The number of missile systems (antiship, surface-to-air [SAM], antisubmarine), gun mounts, and antiaircraft [AA] gun systems; the number of launchers or barrels in them; as well as the number of torpedo tubes are shown on either side of a multiplication sign.

2. Vertical launch system.

U.S. Military Assistance to Foreign States

18010358n Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 11, Nov 1988 (signed to press 10 Nov 88) pp 61- 67

[Article by Lt Col Yu. Malkov]

[Text] Military assistance traditionally plays an important role in U.S. relations with foreign countries and, as repeatedly emphasized in official documents of the American administration, it has been the cornerstone of the country's foreign policy throughout the entire postwar period. As a rule it bears a strictly selective character and is directed above all at carrying out American imperialism's antisoviet, antisocialist and antidemocratic activities. Washington always has conducted a foreign policy course based on principles of a "position of strength" and using an arsenal of forcible means, which in the final account also include military assistance. The fact is that, in accordance with U.S. law, funds allocated within the scope of military assistance programs can be used by the recipient country only for purchases of American arms. This is why the majority of U.S. "peace initiatives" backed by military assistance often lead not to the resolution of controversial problems, as demagogically declared by White House representatives, but to the preservation of existing contradictions whose devastating effect is reinforced under the burden of the arms being supplied.

The actions of American diplomacy to "settle" conflicts in the Near East and in Central America serve as a typical example of this. The rapid growth of arms deliveries to Near East countries in the late 1970's and especially in the early 1980's, which essentially became an integral part of the Camp David accords, in practice only complicated a solution to problems of the near-eastern region. Probably the only concrete result of such a "peacemaking" policy was the opening up of a vast Egyptian market for American military- industrial corporations at the expense of national budget funds, while Israel's aggressive actions toward neighboring Arab states would have been altogether impossible without active and comprehensive financial support on the part of the United States.

Israel was allocated $11.1 billion under the framework of the military assistance program just in the period from 1981 through 1987; 68 percent of this was gratis in the form of so-called "forgiven credits." Since 1985 the entire 100 percent of financial assets allocated to Israel as military assistance has been gratis. Tel Aviv makes annual payments on preferential credits, the overall volume of which reached $25 billion together with

interest by 1984, from sums being received gratis within the scope of theeconomic assistance program (under this program Israel was allocated $6.8 billion during 1981-1987). If we add to this the possibility of using military assistance to pay for arms purchases through commercial channels, it will become understandable that financial "injections" of the overseas protector permit Israeli militarists to purchase in the United States without hindrance any arms needed for realizing their aggressive schemes. On the whole the American administration asked Congress for some $3.2 billion for FY 1988, or more than 54 percent of all funds planned for military assistance to foreign states, to "maintain peace in the Near East."

The United States also sets aside a similar role for military assistance programs in solving the conflict in Central America. The policy, which in words is aimed at resolving issues, in fact only promotes a continuation of combat operations and a dragging out of searches for a solution to the situation at hand on a democratic basis. The annual level of financial assets which the United States allocates for military assistance to three Central American countries—El Salvador, Honduras and Guatemala—averaged over $220 million by the mid-1980's (not counting sums passed directly to the Somoza Contras), which considerably exceeds the overall level of these countries' military expenditures in 1980 (at the moment the conflict began they amounted to approximately $170 million). This proportion shows once again that the Reagan administration essentially paid for upkeep of the armed forces and the repressive apparatus of these regimes, the policy of which provides for a defense of American interests in that region of the world.

Foreign specialists point out that no less important a place also is given to military assistance in achieving military-strategic objectives. In the opinion of the American military-political leadership, under present-day conditions the United States cannot rely only on its own military might in the policy of active opposition to a growth in the USSR's international authority, especially in developing countries. Moreover, the United States cannot always have sufficient forces of its own everywhere for conducting an effective policy of deterrence and defense of its regional interests or the interests of its allies in so-called low-intensity conflict areas. To achieve these objectives the United States tries to make active use of military-political blocs and a system of bilateral relations with its closest allies based on "mutual security" treaties.

American imperialism's views on using the military potential of other countries in its own interests are officially embodied in the military- strategic concept of "total forces," in which military assistance is given a central place. According to a statement by former Chairman of the JCS Adm T. Moorer, "the total forces concept will be successful and viable only if we give assistance to countries where we have mutual interests; conversely, an inadequate military assistance program can depreciate our existing regional and bilateral undertakings and thus increase the danger to our own vital interests."

By "helping" foreign states purchase weapons and military equipment, the United States thus secures the right to retain its own military bases on their territories. For example, under the presently existing American-Filipino agreement on military bases the United States undertook to grant the Philippines military assistance amounting to $900 million during fiscal years 1985-1989. Similar agreements were signed with four other countries—Greece,Spain, Portugal and Turkey.

In addition, military assistance is given to other countries by the United States in exchange for the right to use various military installations on their territories in support of strategic requirements of the American Armed Forces. Such agreements have been signed basically with countries of the Indian Ocean basin. Foreign military specialists believe that cooperation in this sphere will permit a significant increase in U.S. capabilities for strategic troop movements and defense of sea and air lines of communication and simplify logistic support of American units abroad. Another important point is that the existence of such a right permits the United States to substantially reduce expenditures for executing such missions.

During the period from the late 1940's to the present time the United States has given and is giving military assistance to foreign states under the following programs: "Military Assistance Program," "Military Assistance Service Funded," "International Military Education and Training," "Excess Defense Articles," "Ship Transfer," "Military Real Estate Transfer" and "Foreign Military Sales Financial."

The above programs are carried out by the Defense Department, but only some of them are financed from this department's budgetary assets. The importance and relative significance of each of them differs in different stages in the overall scope of military assistance.

The **Military Assistance Program** [MAP] was established in 1949 under the Law on Mutual Military Assistance. It was carried out until 1982 in the form of an uncompensated transfer or leasing of weapons and military equipment as well as by offering services of a military nature. Each year Congress would make allocations to presidential funds for its financing and issue authorizations for contracts under Article 506 of the 1961 Law on Assistance to Foreign States (under this article the Defense Department could conclude contracts before Congress made the decision on allocations to pay for them). Undertakings within the scope of MAP were made chiefly from those allocations and contract authorizations. Until the mid-1970's this program was the chief source for providing commodities and services of a military nature to U.S. allies. Subsequently, however, its

role began to drop, giving way to commercial forms of international military-economic relations, and in FY 1985 the United States entirely ceased concluding agreements for deliveries of weapons and military equipment within the scope of this program. Instead of this, beginning in FY 1982 funds have been allocated under the MAP Program without compensation for financing purchases under the Foreign Military Sales (FMS) Program.

Analyzing the geographic distribution of military assistance under this program, it can be noted that in the period from 1950 through 1963 it was directed primarily to Western Europe for restoring and strengthening the military potential of NATO bloc allies and for supporting reactionary forces of countries which held an important strategic position and where, in the opinion of the American leadership, their loss could threaten U.S. national interests. From the mid-1960's until the mid-1970's the bulk of allocations under this program was made to Southern and Southeastern Asia as well as to the Far and Near East. From the early 1980's to the present time Turkey, Portugal, El Salvador and Honduras have been the primary recipients. Althoughlately the relative significance of the Military Assistance Program within the overall scope of military assistance is only 13 percent, U.S. ruling circles continue to view it as an important instrument for attaining their foreign policy objectives.

The **Service Funded Military Assistance** (MASF), established in FY 1966, was supported from the department budgets of branches of the Armed Forces. This program of uncompensated military assistance was intended for countries and regions which were taking part in the aggressive war against the peoples of Indochina on the U.S. side (South Vietnam, Laos, Cambodia, Thailand, South Korea, the Philippines). This program was the primary one within the overall scope of military assistance in that period, and in 1973 its proportion was around 80 percent. Assistance was terminated under this program was in connection with the fall of pro-American regimes in South Vietnam, Laos and Cambodia.

International Military Education and Training (IMET) is a program of uncompensated military assistance which became independent in FY 1976. Undertakings under this program are made from annual allocations by the U.S. Congress to presidential funds. Up until 1976 allocations for these purposes were included in the MAP and MASF. Since 1950 over 500,000 officers and first-term servicemen have been trained in more than 2,000 specialties under these programs. Training was carried out both in the United States and abroad, in countries receiving American assistance and at special training centers belonging to the United States.

Servicemen of foreign armies who have undergone training under the direction of American instructors usually comprise the backbone of armed forces and are the support for reactionary pro-American regimes in their countries. According to data of American missions abroad, as of 1986 over 1,500 officers who have been trained under this program hold responsible posts in their armed forces. It must be noted that under IMET the United States exerts direct and indirect pressure on the military and civilian leadership of states receiving this form of assistance and thus attempts to weaken the USSR's influence there, especially in developing countries. The IMET Program presently is being given even more attention. The number of states to which it extends rose to 103 in 1986 compared with 63 in 1981, and the number of servicemen- trainees increased from 4,721 to 6,374 respectively.

The **Excess Defense Articles** (EDA) Program was adopted in 1949. Under this program weapons and military equipment which the Pentagon allocates from its stockpiles (i.e., not needed to satisfy Defense Department needs) are delivered abroad. Such deliveries are usually made on an uncompensated basis, but some military products are paid for by the customer. The price is established here with a large discount. No congressional allocations are required to implement this program, although American legislation has set a limit on the uncompensated transfer or sale of arms under this program. For example, it was set at $250 million for FY 1986. Since 1984 this program basically has been realized along the line of Foreign Military Sales and in very small volumes.

The **Ship Transfer** and **Military Real Estate Transfer** programs were adopted in 1949 and 1965 respectively. Their volume was insignificant and at the present time they are not taken into account inconsidering general military assistance programs.

Foreign Military Sales Financial (FMSF) has existed as an independent program since 1969, and prior to this (from 1955 through 1968) it was part of MAP. The overall volume of allocations for that period was insignificant, around $1.5 billion. At the present time the FMSF Program is the principal form of U.S. military assistance to foreign states. Of the overall volume of military assistance ($11.5 billion) during fiscal years 1985-1986, 86 percent, or $9.9 billion, was earmarked for it (Table 1). By issuing credits under FMSF the United States gives principal allies and "friendly countries" an opportunity to purchase arms, military equipment and supplies and to conduct combat and other training. Credits are issued to recipient countries under market interest rates of payment or with special benefits. So-called "forgiven" credits hold a special place; they are a form of uncompensated assistance and presently are granted only to two countries, considered U.S. "strategic partners" in the Near East—Israel (since 1974) and Egypt (since 1982).[1]

Table 1 Volume of U.S. Military Assistance to Foreign States During FY 1983-1987 ($ millions)

Military Assistance Programs	Fiscal Years 1983	1984	1985	1986	1987 (estimate)
Foreign Military Sales Financial	5,106.5	5,716.2	4,939.5	4,946.8	4,040.4
Military Assistance	412.5	699.4	758.1	791.6	900.0
International Military Education and Training	47.7	52.0	55.0	52.1	56.0
Total	5,566.7	6,467.6	5,752.6	5,790.5	4,996.4

A preferential period of 30 years for paying interest (of which no payment is made for the first ten) also is established for some states, while for all others the maximum time period for repayment of credits is set at 12 years, with a special authorization of Congress required to extend it.

The FMSF Program is implemented by using two kinds of credits—direct and guaranteed. In a direct extension of credit the Defense Department finances the purchases of commodities for military purposes from budgetary funds especially appropriated for this purpose. Guaranteed extension of credit does not require such appropriations and is "nonbudgetary." Funds are allocated by the Federal Credit Finance Bank, which in turn accumulates them through loans of capital in the private market. Reimbursements for capital and credits are secured by the Guarantee Reserve Fund, a special reserve established by the U.S. Congress for these purposes.

Direct extension of credit, officially sanctioned by the Arms Export Control Law, was used from 1968 until the mid-1970's, and guaranteed credits became the basic form of financing beginning in 1975. But the inability of manycountries receiving military assistance to pay off debts led to the exhaustion of the Guarantee Reserve Fund. Therefore beginning in 1985 all credits under the FMSF Program became direct and were included in the budget. In the opinion of American economists, the transition to extension of direct budget credit has two principal advantages: it more clearly reflects full expenditures for military assistance to foreign states and it provides greater flexibility in granting privileges for extension of credit if necessary.

In addition, other changes also occurred in FY 1985. Their significance is that the basic portion of military assistance will be granted in the form of subsidies and preferential (low interest rate) credits. Already in FY 1985 the proportion of credits based on market interest rates dropped from 68 to 29 percent of the overall volume of military assistance compared with 1984, while subsidies, including "forgiven" credits, rose from 32 to 59 percent and subsidies and preferential credits from 32 to 71 percent. Thus two-thirds of the FMSF Program now is carried out with preferential treatment.

All this indicates that U.S. military assistance to foreign states does not represent something specific in form and content and embodied legislatively, but it is constantly being improved and changed depending on the existing international situation and the economic conditions. Only its chief purpose remains invariable—attainment of military-political objectives above all. Considering the geographic distribution of assistance, it must be noted that it is directed chiefly to those regions and countries of the world which in the opinion of the American leadership have strategic significance with respect to securing U.S. national interests and strengthening the forces of imperialism, and which also oppose the Soviet Union and other countries of the socialist community (Table 2). Meanwhile, in giving military assistance the United States tries to ensure suffering minimal losses for the national economy and making even such a form of state and political activity commercially profitable for American capital. Statistics

Table 2 Regional Distribution of U.S. Military Assistance to Foreign States During FY 1983-1987 (in %)

Regions	Fiscal Years 1983	1984	1985	1986	1987 (estimate)
Near and Middle East	65.0	61.2	59.4	63.6	72.8
Western Europe	14.0	15.6	18.0	16.1	10.7
Far East	3.3	3.6	4.0	2.8	Under0.01
South Asia	4.7	4.7	5.7	5.4	6.3
Southeastern Asia	3.2	3.3	3.3	3.9	2.4
America	2.7	5.6	4.6	4.4	4.3
Africa	6.3	5.2	4.9	3.7	2.4
Australia and Oceania	Under0.01	Under0.01	Under0.01	Under0.01	Under0.01
Regional and inter-regional funds and international organizations	0.8	0.8	0.1	0.1	1.1
Total	100.0	100.0	100.0	100.0	100.0

indicate that almost all money allocated within the framework of military assistance programs is spent in the United States itself, and in the process considerable monetary returns are ensured in the form of income from taxes and additional employment. Thus, for example, in allocating $100 million gratis under the MAP Program, American taxpayers really do not pay out this entire sum, but only some $55-70 million, because of the expenditure of these funds in the United States itself and compensatory (offsetting) tax revenue. Under the FMSF Program one dollar given in credit with preferential treatment can provide an income of ten cents, and from 30 to 45 cents under the market interest rates.

In the period from 1950 until the late 1980's there was a substantial transformation of the structure and content of military assistance. While previously it basically was an uncompensated transfer of military products and provision of services of a military nature, at the present time it is understood to be the granting of financial assets to foreign states on an uncompensated or preferential basis, assets chiefly used by the recipient country for military purposes. Up to the mid-1970's MAP was the primary program, but from the late 1970's FMSF became the principal form of military assistance (Table 3).

Table 3 Scope of MAP and FMSF Programs During 1970's and 1980's (in $ millions)

	Military Assistance Programs	
Fiscal Years	MAP	FMSF
1970	2,175.7	70.0
1971	2,964.9	743.4
1972	3,287.7	548.0
1973	4,207.6	541.0
1974	1,571.0	2,895.9*
Total	14,206.9	4,798.3
1980	266.2	1,950.0
1981	249.5	3,046.2
1982	394.8	3,883.5
1983	412.5	5,106.5
1984	699.4	5,716.2
Total	2,022.4	19,702.4

*Of which $2,482.7 million were allocated to Israel, including $1,500.0 million as "forgiven" credits.

Meanwhile the proportion of uncompensated military assistance continues to be significant, and during FY 1985-1986 it was $7.2 billion, or 62 percent of the total volume of military assistance (Table 4). Another typical feature of this period is that with the overall trend toward cutting expenditures, the U.S. administration has been attempting to preserve and even increase the volume of military assistance to foreign states within the scope of corresponding programs, motivating this above all by the interests of ensuringsecurity both of the United States itself and of its allies.

Table 4 Uncompensated U.S. Military Assistance to Foreign States During FY 1983- 1987 (in $ millions)

	Fiscal Years				
Military Assistance Programs	1983	1984	1985	1986	1987 (estimate)
"Forgiven" Credits Under FMSF Program	1,175.0	1,315.0	2,375.0	2,966.7	3,100.0
Military Assistance Program	412.5	699.4	758.1	791.6	900.0
IMET	47.7	52.4	55.0	52.1	56.0
Total	1,635.2	2,066.8	3,388.1	3,810.4	4,056.0

For example, for FY 1987 the Reagan administration asked Congress to approve appropriations for military assistance to foreign states (FMSF, MAP and IMET programs) amounting to $6.7 billion. This exceeded by almost one billion dollars the sum for those purposes in the preceding fiscal year. The request was not approved by Congress, however, and all military assistance was specified in an amount of around five billion dollars, which is $1.7 billion less than requested and almost $800 million below the FY 1986 level. Although appropriations for the MAP and IMET programs were reduced compared with what was requested, they exceeded the sums allocated in 1986 by $108.4 and $3.9 million respectively.

The FMSF Program underwent the greatest changes. It was reduced by more than $800 million compared with FY 1986 appropriations and by $1.6 billion compared with the FY 1987 request. In addition, while there were 18 states among recipients of assistance under the FMSF Program in FY 1986 and the request for FY 1987 envisaged 24 countries, only seven recipient countries were approved by Congress for FY 1987 (Israel, Egypt, Greece, Turkey, Spain, Pakistan and Morocco). All of them will receive only preferential credits, while Israel and Egypt will receive the already traditional "forgiven" credits. It should also be noted that assistance to Israel and Egypt approved under the FMSF Program underwent no changes compared with the request and is $1.8 billion and $1.3 billion respectively. Instead of credits amounting to $340 million under market interest rates, Pakistan was offered $312.5 million with preferential treatment. Credits for Turkey were reduced, but uncompensated assistance under the MAP Program was increased.

These examples show that despite steps being taken to reduce expenditures, the American administration nevertheless is trying to do everything possible for its principal allies. Moreover, emphasizing that a reduction of expenditures for military assistance can negatively affect U.S. foreign policy interests, in early 1988 the administration requested supplementary appropriations for FY 1987 in an amount of $461 million ($261 million under the MAP Program and $200 million under the FMSF Program).

Inasmuch as the principal foreign policy objectives of American ruling circlesremain the same, including in the sphere of military assistance to foreign states, it can be assumed that the United States will continue to use military assistance chiefly for strengthening its allies located in areas contiguous with the Soviet Union's borders or which have "strategic importance for national interests"; for fighting progressive and national liberation movements and a growth in influence of socialist states in developing countries; and for strengthening imperialism's positions in general and the American position in particular.

Footnotes

1. In 1982 "forgiven" credits amounting to $50 million also were granted to the Sudan.

South Korea's Communication Routes and Transportation

18010358o Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 11, Nov 1988 (signed to press 10 Nov 88) pp 67- 72

[Article by Lt Col V. Kulikov]

[Text] South Korea is situated on the Korean Peninsula south of the military demarcation line running near the 38th parallel. It has a population of around 42 million persons and an area of almost 100,000 km^2. The territory extends 400 km from north to south and 300 km from west to east.

The layout of ground lines of transportation largely is determined by South Korea's peninsular situation, the nature of its terrain (the greater part of the territory is occupied by low mountains) and by the disposition of economic areas (Fig. 1).

Prior to World War II the transportation network on the southern peninsula was poorly developed. There was essentially no maritime transportation (capable of accomplishing intercontinental shipping) or air transportation. This began to develop intensively beginning in the 1960's. In two and a half decades the volume of freight shipped and domestic freight turnover on all kinds of transportation rose 8.3-8.5 times (from 32 million tons and 4 billion ton-km in 1961 to 265 million tons and 34 billion ton-km in 1986). In this same period annual passenger turnover rose 11 times (from 10 billion to 112 billion passenger-km) and passenger movements over international routes increased 160 times, reaching five million persons in 1986.

An overall characterization of domestic shipments in South Korea is given in Table 1, and data on the volume of principal freight and the domestic freight turnover are given for individual kinds of transportation in tables 2 and 3.

Table 1 Domestic Shipments by Various Kinds of Transportation in South Korea (1980-1986)

	Railroad			Motor			Maritime			Air		
Characteristics	1980	1985	1986	1980	1985	1986	1980	1985	1986	1980	1985	1986
Freight volume, million tons	49	55.3	58.2	104.5	148.7	168.8	19.2	34.2	37.6	0.01	0.07	0.08
Proportion of overall volume, %	28.4	23.2	22.0	60.5	62.5	63.8	11.1	14.3	14.2	-	-	-
Freight turnover, million ton- km	10,798	12,296	12,813	4,920	7,068	8,034	7,463	11,639	13,034	5.1	26	29
Number of passengers, millions	430.7	503.1	518.9	8,039	10,601	10,932	8.5	8.5	8.7	1.4	3.4	4.1
Passenger turnover, million passenger- km	21,640	22,595	23,563	64,131	78,025	79,732	401	570	551	528	1182	1431

Table 2 Volume of Principal Cargoes Transported in 1986

Kinds of transportation	Coal	Cement	Grain	Petroleum and Petroleum Products	Ores
Rail	26.7*/68	11.8/47	0.4/4	3.6/14	3.9/28
Motor	8.9/23	8.2/32	11.6/95	8.3/31	7.4/55
Maritime	3.7/9	5.2/21	1.5/1	1.4/55	2.3/17

*Here and throughout the table the numerator indicates freight volume in millions of tons and the denominator the percent of total volume of that freight.

Fig. 1. South Korea's principal lines of transportation

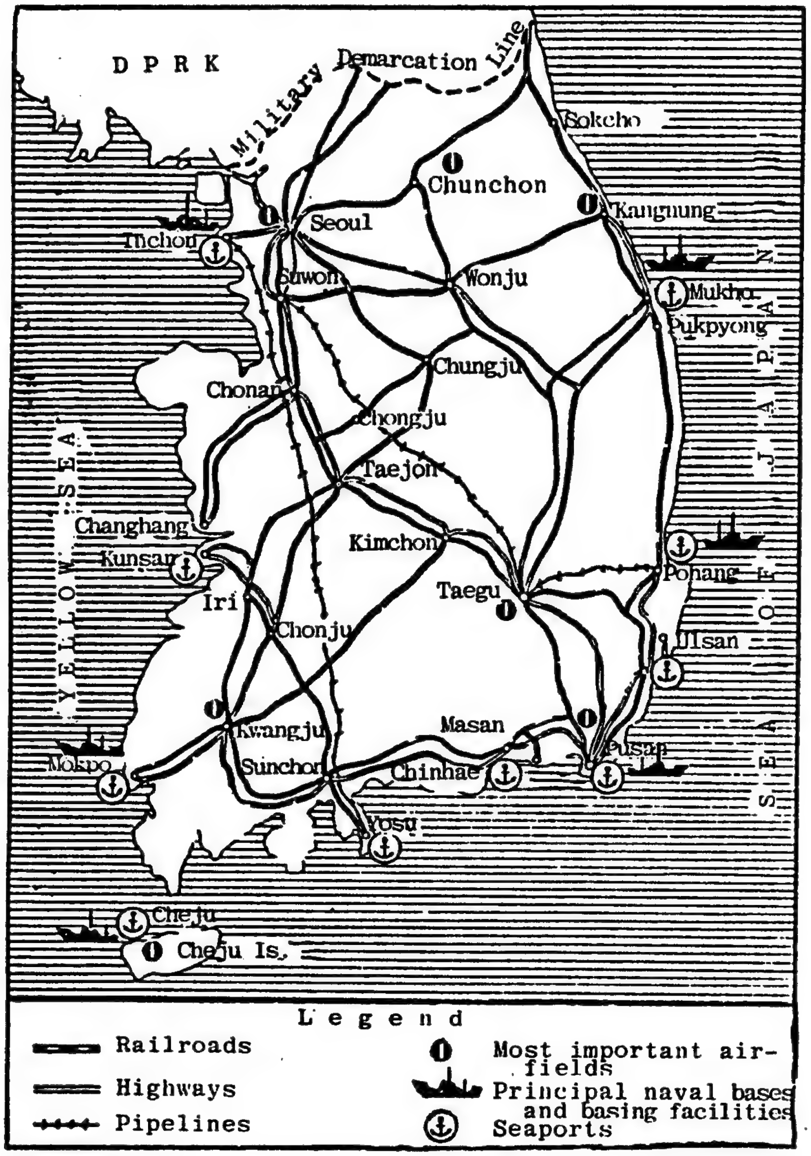


Table 3 Domestic Freight Turnover by Principal Kinds of Freight in 1986

Kinds of Transportation	Coal	Cement	Grain	Petroleum and Petroleum Products	Ores
Rail	5,358*/80	2,515/50	139/21	785/10	968/57
Motor	257/4	248/5	424/65	247/3	390/23
Maritime	1,097/16	2,233/45	91/14	67/87	341/20

*Here and further in the table the numerator indicates freight turnover in millions of ton-km and the denominator the percentage of that freight in overall freight turnover.

These data indicate that motor and rail forms of transportation are the most important based on volume of transported freight; rail, maritime and motor transportation are the most important based on freight turnover; and motor transportation is most important based on the number of passengers transported and passenger turnover.

The state allocates all funds for developing rail transportation. It also covers around 30 percent of expenditures for motor and maritime transportation, and around 40 percent for air transportation. The remaining funds come from the private sector. In financing the principal forms of transportation the Seoul administration has an opportunity to influence transportation development in accordance with its militaristic objectives.

Rail transportation, in which 40,000 persons are employed, plays an important role in South Korea's economy. It accounts for over 20 percent of all freight shipments based on volume, around 40 percent based on freight turnover, as well as over 20 percent based on passenger turnover. Each year rail transportation is used by more than 500 million passengers and it carries approximately 60 million tons of freight, i.e., the greater part of all high- volume freight necessary for industrial production. The main ports, industrial centers and military installations are linked by rail routes, which makes it possible to deliver freight coming from outside, move combat equipment, and redeploy both South Korean as well as American troops in short time periods.

The overall length of all railroads (counting spur tracks and secondary tracks) is around 6,300 km. All have a gauge of 1,435 mm. The routes stretch for over 3,100 km, of which more than 800 km are double-track lines and more than 1,000 km are electrified. The density of railroads is over 6 km per 100 km^2. A subway operates in the cities of Seoul and Pusan.

A large number of tunnels (overall length over 150 km), bridges (124 km) and various drainage facilities have been built on the rail routes and there are many inclines and sharp turns. Bridges over the Han River not far from Seoul as well as bridges over rivers and small sea inlets (Fig. 2 [figure not reproduced]) near Pusan play an important role.

At the present time a total of over 480 diesel locomotives, more than 90 electric locomotives, and 18,300 railcars, of which approximately 2,200 are passenger cars, are being operated on the railroads. The average weight of a freight train is not large (around 500 tons); the average number of passengers in a passenger train is over 500 persons.

The basic freight transported by rail consists of coal, cement, ores, petroleum and petroleum products, which account for up to 80 percent of all shipments.

The double-track Seoul-Pusan line with a capacity of up to 135 pairs of trains per day, is one of the country's most loaded lines. It carries the greater part of all rail freight. The Seoul-Taejon section is considered to have the heaviest traffic. In the future it is planned to increase this railroad's capacity by 30-100 percent (in various sections).

Heavy traffic—up to 60 pairs of trains a day—also is organized on theTaejon-Kwangju-Mokpo main line. Other important freight lines are the 200-km Iri-Yosu and Wonju-Kangnung routes and the Pusan-Pohang and Chonan-Changhang sections (both 145 km long), which can pass up to 45 pairs of trains a day. Seoul, Pusan, Taejon, Kwangju and Taegu are considered the largest rail junctions. South Korea has a total of some 600 railroad stations.

The South Korean press notes that the principal directions for developing rail transportation and for increasing its hauling and traffic-carrying capacity are an increase in weight of freight trains, construction of a second track on the most heavily traveled sections, electrification of existing lines, replacement of the narrow gauge with standard gauge and, finally, construction of new lines.

The essential role played by South Korea's **motor transportation** is confirmed by the fact that it carries over 60 percent of all freight by volume and it accounts for around one-fourth of freight turnover as well as approximately 90 percent of domestic passenger movements. The greater part of such freight as grain, mineral fertilizers, timber and lumber is transported by motor vehicle.

The density of highways in the southern part of the Korean Peninsula is approximately 50 km per 100 km^2, and they have an overall length of 52,300 km. More than 55 percent of roads have an asphalt concrete surface (Fig. 3 [figure not reproduced]), approximately one percent are dirt roads, and the surface of the remaining roads is gravel. Foreign military specialists believe that the existing highway network satisfies the requirements of South Korean troops and of the American troops stationed here and that it permits moving subunits and units efficiently. Highways are characterized by the presence of a large number of bridges, tunnels, and steep upgrades and downgrades. Bridges over the lower reaches of the Naktong River play an important role.

The principal main lines are the following: the four-lane Seoul-Inchon highway (a length of around 30 km), linking the capital with the second-largest port city; the four-lane Seoul-Pusan main highway (428 km), running through the cities of Suwon, Chonan, Taejon and Taegu; the Pusan-Kwangju-Mokpo highway (358 km), running along the south coast, with vehicles traveling in two lanes in each direction; and the 3-4 lane 200 km Suwon-Wonju-Kangnung highway linking mineral-rich eastern areas with the capital area and the most important economic centers. A highway also has been built along the country's east coast.

The motor vehicle pool numbers over 1.3 million vehicles, of which passenger vehicles make up over 660,000 and buses 150,000. In addition there are more than 700,000 motorcycles.

Maritime transportation holds an overall third place, although in recent years it already has greatly outstripped rail transportation in freight turnover. It is used to deliver the bulk of the kinds of mineral raw materials absent in the country and to make more than half of the entire volume of export-import shipments. As of mid-1987 the merchant fleet numbered 1.899 vessels with a gross register tonnage [GRT] of 100 or more, holding 14th place in the world fleet (for comparison it held 17th place in 1981). Their gross tonnage was more than 7.2 million GRT and deadweight was 11.5 milliontons. They serve routes linking the southern part of the Korean Peninsula with countries of North and South America, Europe, the Near East and Southeast Asia.

Of the overall number of merchant fleet vessels, there are some 180 tankers with an overall 1.2 million GRT and a deadweight of 2.1 million tons; 145 bulk carriers (3.5 million GRT and 6.2 million tons respectively), 290 vessels for transporting general cargoes (0.76 million GRT and 1.2 million tons), and 27 containerships (0.36 million GRT and 0.38 million tons).

The foreign press notes that South Korea uses vessels flying the flags of other states for its own needs. For example, more than 80 South Korean vessels with an overall deadweight of more than two million tons are registered under the flags of Liberia and Panama.

Coastal shipping became widely developed for the southern peninsula with consideration of the geographic position. Approximately one-fifth of all freight accounted for by maritime transportation is transported by the coastal fleet, which has a large number of vessels with overall GRT of around three million. The principal place among freight transported by the coastal fleet is held by petroleum (over 70 percent of the entire freight turnover), cement (more than 10 percent) and coal (almost 10 percent).

Western military specialists emphasize that the coastal fleet can be used extensively for moving troops and military cargoes if necessary.

The large stretch of coastline and the indentations of the southern and western coasts create favorable conditions for basing the fleet, but of the 1,350 mooring points and ports only around 50 ports are used for transshipping freight delivered by marine vessels. The largest of them are Pusan (serving a third of foreign trade), Inchon, Pohang, Ulsan, Mukho and Masan. Their characteristics are given in Table 4. A number of ports specialize in processing specific cargoes. For example, Pohang provides raw materials to the Pohang Metallurgical Combine, and transshipment of petroleum and petroleum products is accomplished primarily in Ulsan. The cumulative annual freight turnover of the ports exceeds 200 million tons.

Table 4 Characteristics of Main Ports

Port Name	Annual Freight Turnover, million tons	Maximum Deadweight of Vessels Received, thousand tons	Number of Vessels Simultaneously in Port
Pusan	37.5	50	52
Pohang	33	100	20
Inchon	32	50	30
Ulsan	30	40	15
Mukho	4	10	6
Masan	3.5	20	11
Kunsan	2	20	6
Yosu	1.5	6	7
Cheju	1.5	5	6
Mokpo	1.2	10	4

The South Korean Navy is based at the main Navy base of Chinhae and at naval bases and basing facilities of Pusan, Inchon, Mokpo, Pohang and Pukpyong.

Judging from South Korean press reports, seaports will be used widely by the United States in case of the movement of reinforcing units and military equipment.

Development of maritime transportation and port facilities continues at the present time. Primary emphasis is placed on increasing cumulative tonnage of vessels and improving the fleet's structure.

Air transportation saw development from the middle of the last decade. The only airline, Korean Air Lines, has almost 50 aircraft. A fifth of them is used for freight shipments (Fig. 4 [figure not reproduced]), and the others for passenger movements. The latter have almost 9,000 seats. Over half of the aircraft pool consists of Boeing 747 and A-300 widebody aircraft. In addition to local routes, South Korean aircraft service approximately 30 international routes to countries of Asia, the Near East, Western Europe and North America, linking Seoul with the cities of Tokyo, Xianggang, Manila, Bangkok, Paris, Amsterdam, Los Angeles, New York and others. Other local lines make Seoul-Pusan, Seoul-Cheju, Pusan-Cheju flights.

In 1986 air transportation carried around four million passengers on domestic routes and almost as many on international routes.

The largest international airport, Kimpo (near Seoul), has a runway 3,200 m long and 45 m wide. Its capacity is approximately five million passengers and 280,000 tons of freight per year. In the future it is planned to bring the airport's capabilities for serving passengers up to nine million persons and for processing freight up to one million tons of freight per year. Another important airport, Suyung (Pusan)—has a runway 2,000 m long and 45 m wide. It is capable of receiving 1.3 million

passengers and processing 140,000 tons of freight per year. In addition to those mentioned, major airports have been built in the cities of Taegu, Kwangju, Kangnung and Cheju.

Table 5 gives characteristics of the most important airfields.

Table 5 Characteristics of Principal Airfields[1]

Airfield Name	Runway Center Coordinates North Latitude	East Longitude	Main Runway Length, m	Runway Strength[2], tons-force
Kangnung	37°45'	128°57'	2,580	7
Kwangju	35°07'	126°49'	2,800	34
Kunsan	35°54'	126°37'	2,700	45
Osan	37°05'	127°02'	2,700	34
Pusan (Suyung)	35°10'	129°08'	2,000	14
Seoul (Kimpo)	37°33'	126°48'	3,200	29
Suwon	37°14'	127°01'	2,700	45
Taegu	35°53'	128°40'	2,700	29
Cheju	33°30'	126°30'	2,000	20

1. With the exception of airfields in the cities of Pusan and Cheju, the others are used by the Air Force.
2. Indicator of permissible impact force created by the tires on the wheels of one aircraft landing gear strut in a landing.

All main airfields have a concrete or asphalt concrete runway surface. The majority of them are used by the South Korean or U.S. air forces.

Domestic water transportation is poorly developed, although South Korea has a ramified river network. The overwhelming majority of rivers are short and the flow of many bears a seasonal character. They become high in the period of monsoon rains. The estuarine sections of major rivers affected by marine tides are accessible for marine vessels. Rivers are used most often for local shipments by small vessels.

Pipeline transportation also is poorly developed. At the present time a pipeline is in operation running from the port of Pohang through Taegu and Suwon to Seoul. It is some 400 km long and has a capacity of 6,500 tons of petroleum products per day. It is used for supplying South Korean and American troops with fuel. One other oil products line connects the port cities of Inchon and Yosu. In the future it is planned to build an offshoot from this oil products line to the port of Ulsan.

In the opinion of western specialists, South Korea's transportation is rather well developed on the whole. Its capabilities permit meeting the needs of industrial enterprises for raw materials and set-completing articles and supporting passenger movements as well as movements in the interests of the armed forces.

Additional Equipping of Royal Air Force Stornoway Airfield

18010358p Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 11, Nov 1988 (signed to press 10 Nov 88) pp 73- 74

[Article by Col V. Elin]

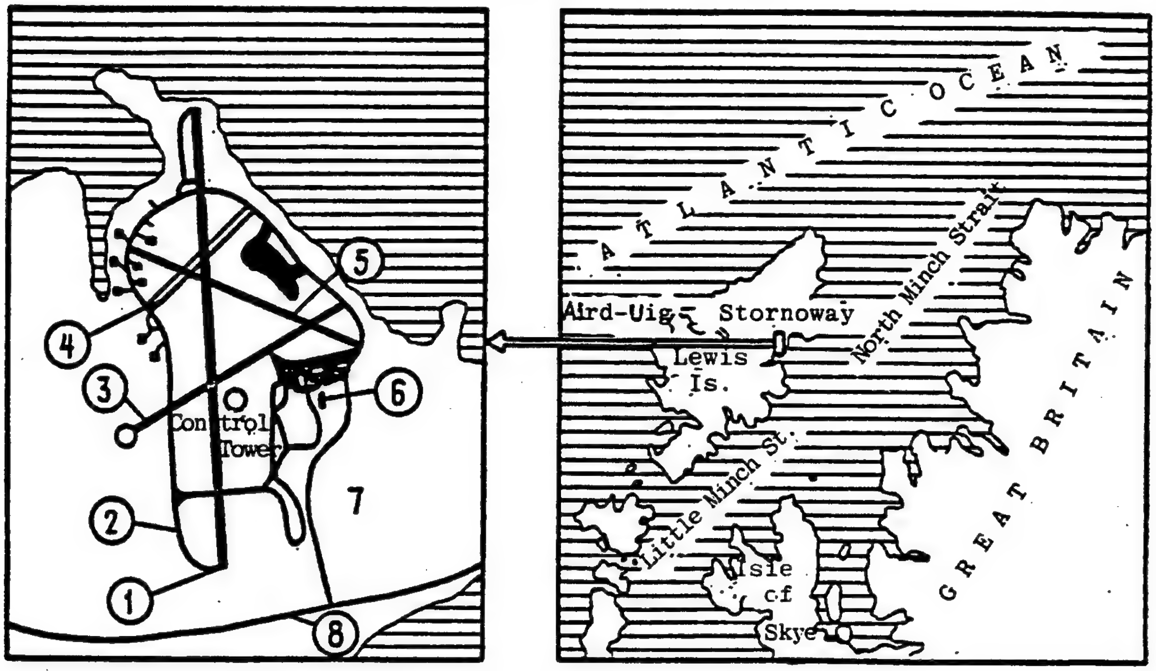
[Text] NATO countries continue work of expanding the airfield network and improving air bases. Stornoway Airfield (Fig. 1) is one such installation where facilities are being renovated and equipment replaced. It was named for the nearby principal city of Lewis Island, largest in the Hebrides Island group (its area is around 2,300 km^2; the climate is oceanic, cool and moist; and maximum elevation above sea level is 799 m).

There are constantly 25 servicemen and four civilian specialists at the airfield for routine servicing and maintenance of communication, navigation and aircraft landing equipment as well as equipment of the radar station and communication center in Aird-Uig (some 50 km west of Stornoway). Despite the small size of the permanent contingent, however, this installation is being given an ever increasing place in NATO plans. This is true especially in questions of air defense inasmuch as, as the journal AIR PICTORIAL emphasizes, its "geographic location is simply ideal in this respect."

The history of the air force base at Stornoway is typical. The dirt airfield was purchased by the military department in 1939. Soon a runway and taxiways with a fine crushed rock surface were built and hangars and living spaces were erected. During World War II air subunits were stationed there which operated basically on enemy sea lines of communication in the North Atlantic in order to disrupt them. As a comparison it can be noted that in late 1944 the base's permanent party numbered 2,200 servicemen. Although after the war the airfield was returned to civilian administration, in subsequent years it continued serving as an alternate for movement of military cargoes from the United States to Europe. In the early 1960's it was again transferred to the Air Force and signals, EW and other subunits were deployed there in support of Vulcan bomber flights. Then the base was mothballed.

In 1979 the UK Ministry of Defence decided to additionally equip the airfield and turn it into a major forward air base in this area to be used in the interests of the Royal Air Force and NATO Joint Air Forces, and it allocated 40£ million for these purposes. The phased work program provided for lengthening the main runway and constructing reinforced aircraft shelters, taxiways and two POL depots. It was planned to complete this in the mid- 1980's.

Fig. 1. Layout of Stornoway Airfield



Key:
1. Main runway
2. Taxiway
3. Alternate runway
4. Alternate runway (presently not in use)
5. Taxiway
6. Airport building
7. Proposed site for constructing equipment shelters
8. Road

At the present time the length of the main runway has been increased to 2,200 m and that of the alternate runway to 1,200 m (Fig. 2 [figure not reproduced]). They are each 46 m wide and they have a surface of fine compacted crushed rock which has been first treated with a binder. Fixed arresting gear has been installed at both ends of the main runway. Landing under adverse conditions is supported by a Cossor CR 62 landing assist radar, which is coupled with a Plessey AR 1 (AT) mobile surveillance radar (Fig. 3 [figure not reproduced]). The latter is installed temporarily.

A new taxiway was built in the western part of the airfield in place of old shelters that were taken down. In the near future it is planned to begin building reinforced aircraft shelters as well as shelters for other equipment and personnel. A berth for unloading fuel from support vessels will be one more new and significant element of the base. It will be connected by pipeline with the depot storage tank, which also will be connected to a centralized aircraft fueling system. Its hydrant pits will be set up immediately near combat equipment shelters.

Necessary flight ground support equipment, motor transport, fire and ambulance vehicles, refuelers, prime movers and so on have been brought onto the airfield. All this equipment is to be used only in support of combat aviation flights. In addition there are plans to form a specially equipped subunit assigned to frighten birds from the vicinity of the airfield during flights.

Radio equipment has been installed at the airfield for reliable communications with crews in the air and over direct channels with the air defense sector operations center, radar stations and various headquarters. In peacetime air traffic control is organized by civilian employees of the National Air Traffic Control Service, but when missions are worked at Stornoway under plans of the Air Force command, air traffic control is performed by military specialists. The latter arrive (usually aboard C-130H aircraft) together with necessary gear a minimum of three days before arrival of combat aircraft at the base. In this time they receive the equipment from civilian employees and test it in operation. The attachment of a total of some 100 persons is envisaged for supporting combat aviation flights. Necessary specialists can be sent to Stornoway from any air base (not necessarily from the one where the arriving air subunit is permanently based).

Judging from foreign press reports, combat aircraft will fly in to the base periodically to practice missions in accordance with national plans and to participate in NATO exercises. In 1988 the 43d and 29th fighter squadrons began "mastering" and acquiring experience

of using the forward base. The first has Phantom-FG.1 fighter-interceptors in the inventory (permanent base station at Leuchars Air Base), and the second is equipped with Tornado-F.3 aircraft (Coningsby).

By agreement with local authorities it has been established that combat aircraft flights will be conducted for no more than six weeks a year (by tradition, flight operations are not conducted on Sunday). Foreign military specialists assume that this will be most likely three independently organized deployments of Air Force units (two weeks each).

Reorganization of Japanese Army Infantry Divisions

18010358q Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 11, Nov 1988 (signed to press 10 Nov 88) p 75

[Article by Col V. Rodin]

[Text] An improvement in the organization and establishment of combined- arms large units is one of the directions for improving Army combat capabilities as provided by the five-year plan for organizational development of the Japanese Army for 1986-1991.

The organization and establishment of infantry divisions has been retained in the Army since 1961; it provides for the presence of large units of two types, A and B. The Type A division has four infantry regiments, one artillery regiment (four battalions), three battalions (tank, engineer, and signal) and seven separate companies (reconnaissance, antitank, army aviation, artillery equipment, supply, medical, and motor transport). The division has some 9,000 personnel, 60 tanks, 150 field artillery pieces and mortars, almost 150 antitank weapons, 20 antiaircraft guns and 14 APC's. The Type B division has one infantry regiment, one tank company and an artillery battalion less. It has a total of some 7,000 personnel, 45 tanks and 110 field artillery pieces and mortars.

In the Army command's estimate, in contrast to similar large units of European NATO countries, the Japanese division has comparatively small firepower and low mobility (practically a total absence of APC's and transportation assets for moving personnel), poor outfitting with air defense equipment and an inadequate organization of logistic support subunits. The current five-year plan provides for beginning a reorganization of infantry divisions, to be carried out above all in the Northern Army.

The foreign press reports that at the present time measures have been completed for converting the 2d Infantry Division (Type A) to the new structure. It has seven regiments: four motorized infantry regiments (one on APC's with over 100 vehicles and three on motor vehicles), one tank regiment (activated on a battalion base and includes five tank companies with a total of 74 tanks), one artillery regiment (105-mm and 155-mm towed howitzers have been replaced by 155-mm self-propelled howitzers with a total of 55 units) and one logistics regiment (on a base of logistic support subunits). In addition, this division includes a separate air defense battalion (activated on the base of an artillery regiment air defense battery; it has two Tansam SAM batteries with four launchers and two antiaircraft gun batteries each for a total of 20weapons) and a platoon for defense against weapons of mass destruction. The structure of combat support subunits has been changed with the objective of increasing their capabilities. As a result of the reorganization, the division has 9,100 personnel, 74 tanks, some 180 field artillery pieces and mortars, approximately 30 air defense weapons and other materiel.

In the Japanese command's assessment, the reorganization of Type A and B divisions will permit increasing the firepower and mobility of combat subunits and units as well as increasing efficiency in the work of logistic support subunits. It is emphasized that it is planned to carry out a reorganization of the 5th (Type B) and 11th (Type A) infantry divisions of the Northern Army before 1990.

Swiss GDF-005 Antiaircraft Mount

18010358r Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 11, Nov 1988 (signed to press 10 Nov 88) pp 75- 76

[Article by Col N. Fomich]

[Text] In the late 1950's the Swiss firm of Oerlikon developed a 35-mm twin antiaircraft mount designated the GDF-001. It consists of two automatic guns, hydraulic recoil brake, sights for firing against air and ground targets, laying mechanisms with electric drives, four box magazines, a saddle and a bottom carriage. The bottom carriage is a four-wheeled platform with two girder outriggers and jacks. Principal specifications and performance characteristics of the antiaircraft mount are as follows: combat weight 6.7 tons, length in traveling position 7.8 m, length at firing position 8.83 m, a width of 2.26 m and 4.49 m respectively, and a height of 2.6 m and 1.72 m respectively. The effective slant range is up to 4 km and the inboard ammunition stowage is 238 fragmentation-incendiary and armor piercing- incendiary projectiles.

An advanced version of this mount, the GDF-002, appeared in 1980. It differed from the base model by the presence of a new optical sight of the British firm of Ferranti and digital data transmission equipment for

firing. The foreign press notes that some 1,600 antiaircraft mounts (basically the first modification) had been produced by 1983. They were supplied to armies of over 20 capitalist countries. In Japan 54 GDF-001 antiaircraft mounts were produced under license and later entered the army inventory.

A second improved version, the GDF-005 (see color insert [color insert not reproduced]), was created in 1985. It uses the self-contained Gun King system, which includes a laser rangefinder and microprocessor. Necessary firing data are calculated automatically. In contrast to previous versions, this mount is equipped with automatic loaders (with hydraulic drives) and a new power supply unit accommodated on the platform (previously it was separate). The inboard ammunition stowage has been increased to 280 projectiles. A gunner-operator conducts fire. His work station has an armor barrier providing protection against bullets and fragments of artillery projectiles.

A type battery in Switzerland includes two twin 35-mm antiaircraft mounts and the Skyguard radar system. The latter includes combined target designation and gunlaying radar, target tracking television equipment, control panel, computer and portable sighting device. An option also is envisaged for jointuse of these antiaircraft mounts and Sparrow surface-to-air missiles, where the Skyguard radar system also is used (see figure [figure not reproduced]).

Singer Trains C-130 Crews

18010358s Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 11, Nov 1988 (signed to press 10 Nov 88) p 76

[Article by Col V. Shturmanov]

[Text] One direction for improving the combat effectiveness of U.S. forces without increasing the personnel strength established for peacetime is to use firms and other civilian organizations to accomplish secondary missions. This frees up a rather considerable number of servicemen, who undergo combat training in their own units and subunits, i.e., they are used for their direct purpose.

For example, the Pentagon concluded a contract with Singer under which the latter assumes full responsibility for organizing and conducting scheduled and unscheduled ground training for flight crews and maintenance personnel of C- 130 Hercules aircraft of the U.S. Air Force Military Airlift Command [MAC]. Such training is conducted in the American Air Force to maintain the desired level of training of crews (teams), with the objective of restoring skills after a lengthy break in flying (for maintenance) or when shifting to new kinds of combat employment.

The firm set up a special group to accomplish this task. Training bases (classrooms, simulators and so on) set up at six U.S. Air Force bases—Little Rock (Arkansas), Dyess (Texas), McChord (Washington), Pope (North Carolina), Kirtland (New Mexico), as well as Clark (the Philippines)—belonging to MAC were transferred to its management. In addition to conducting training, the group is responsible for maintaining and modernizing all equipment at these training bases.

The training course conducted by group specialists with MAC personnel includes theoretical classes and practical exercises on integrated simulators and other training equipment. The training program adopted by the U.S. Air Force presently is being used. It includes practice of the following basic lessons: procedure of actions in various conditions of a tactical situation; flying in adverse weather conditions (on instruments); crew teamwork; interworking among crews; executing a specific advanced flying assignment or flight phase, and so on.

Subsequently it is planned to shift to a new program being developed by Singer and Air Force experts and to adopt an automated system for evaluating the training level of crew members at a given moment. It is noted that the lattershould permit better planning of the kind, time periods and number of training sessions and training flights.

American specialists estimate that development of the new instructions and programs will be completed by the beginning of 1990. By this same time the aforementioned automated system also will become operational. Because of this up to 7,000 persons a year will be able to go through the training.

Plans for Creating a New Radar at the Kwajalein Range

18010358t Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 11, Nov 1988 (signed to press 10 Nov 88) p 77

[Article by Col V. Pavlov, candidate of military sciences]

[Text] Judging from foreign press announcements, the Pentagon intends to deploy a new phased-array TIR (Terminal Imaging Radar) within the scope of SDI at the Kwajalein Range in the Pacific (Kwajalein Atoll). The radar will be used for practicing modes of detecting ballistic targets not only on the terminal leg of the flight, but also on the mid course leg (outside the atmosphere), as well as modes of recognition and tracking based on imaging data received and issuance of target designation information to BMD systems.

American military experts believe that creation of a network of ground radars, including with mobile basing, for forming an information field in BMD interests can

prove to be a less costly option compared with space-based radar. In particular, in the assessment of Raytheon (prime developer of the TIR) specialists, the cost of a life cycle of a ground radar system will be around five billion dollars, which is much less than that for a system of space-based sensors. A distinctive feature of the TIR is considered to be the high operating band of frequencies (5.2-11 GHz). It is assumed that functioning in this band will permit increasing resolution in angular coordinates and provide additional capabilities for accomplishing target recognition and selection tasks against a background of jamming and decoys.

TIR construction at the Kwajalein Range is planned for fiscal years 1989-1990 and demonstration tests and concept verification are to begin in October 1991. The radar will be accommodated on a rotating platform for the tests; an option where it is oriented in a preset direction is being considered for installation at a combat position. In addition, the possibility of accommodating the TIR on a railroad flatcar (see figure [figure not reproduced]) is being studied.

Proponents of creating the TIR assume that it will be integrated with sensors accommodated aboard airborne and space platforms. The sensors will operate in the infrared band, which will considerably hamper simultaneous jamming in the operating band of the radar and sensors. In addition, this can promote increased accuracy of trajectory measurements and on the whole more effective accomplishment of tasks of information support to weapon systems, including advanced systems being developed within the scope of the "star wars" program.

Semisubmersible Remotely Controlled Minehunter

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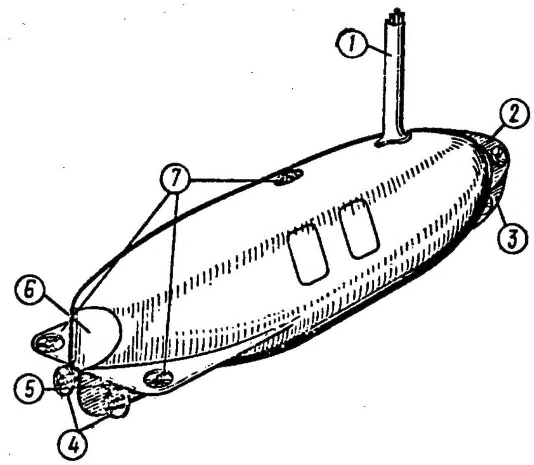
[Article by Capt 2d Rank V. Mosalev]

[Text] The Italian firm of Gaimarine developed the remotely controlled SSM (Semisubmersible Minehunter), from which the small cable-controlled Pluto* mine countermeasures submersible will be used. The minehunter maneuvers at periscope depth with a sea state of up to 4-5. She is 7 m long and around 2.5 m wide. Her docking well can accommodate the Pluto vehicle, which departs and returns to the minehunter through an after hatch. Within this well is a special device permitting automatic reloading (by radio commands) of the mine countermeasures submersible with suspended charges up to six times. The power plant supports operation both of the minehunter herself and of the Pluto submersible. It is accommodated in the midsection of the SSM hull and includes two diesel generators, one of which supports her movement and the other the operation of on-board machinery. The minehunter moves underwater at a speed up to 6 knots using two after screws (see diagram) and maneuvers using five thrusters—three vertical (in the stern and midsection) and two horizontal (one each at bow and stern). Two sonar antennas are mounted in the lower bow section of the minehunter: a minehunting sonar and a high-resolution mine recognition sonar.

External view of SSM minehunter



Key:
1. Snorkel with control system antenna
2. Bow horizontal thruster
3. Fairing for sonar antennas
4. After screws
5. After horizontal thruster
6. After docking well hatch
7. Vertical thrusters

The SSM can be controlled from a special control station accommodated in a standard 3.0x2.4x2.4 m cabin-container. Such a station can be accommodated on any ship or vessel or on shore, and over VHF radio communication channels it is possible to control from its control panel the maneuvering of the minehunter herself and of the mine countermeasures submersible as well as operation of the sonar and release of a suspended charge. The cabin-container and all control station systems can be powered from the on-board supply system of the ship or vessel or from a portable self-contained generator.

One modification of the Pluto mine countermeasures submersible which isplanned to be used with the SSM minehunter has a NATO-standard charge, search sonar (mine detection range 200 m) with electronic beam scanning in a 120° sector and 40 lobes on the radiation pattern, as well as a mine recognition sonar (effective range 7.5 m) with mechanical beam scanning at a rate of 2 revolutions per second.

The foreign press notes that the SSM semisubmersible minehunter with Pluto mine countermeasures submersible will permit secretly hunting and destroying mines

and underwater obstacles in the vicinity of an upcoming amphibious assault landing.

Footnotes

*For more detail on the Pluto vehicle see ZARUBEZHNOYE VOYENNOYE OBOZRENIYE, No 4, 1984, pp 59-60 and No 12, p 85—Ed.

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